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Relay Pumping on the Kaw River

No. 8 Plant of the Stewart Sand Company Has a Model Steel Dredge and a Unique Dewatering and Double Pumping System

By Edmund Shaw
Editor of Rock Products

THE No. 8 Plant of the Stewart Sand Co., Kansas City, is situated on the Kaw river, in Kansas, about nine miles from Kansas City, Mo. This river is paralleled by the tracks of two or three railroads and the Kaw Valley electric line at many places, but at the point where the plant is located, the bank is low and liable to be flooded in times of high water, so that the railroads are a considerable distance from the water.

As the loading bin from which the railroad cars are filled has to be placed on the track, the transportation of the sand, which is pumped from the river, over the distance between the water and the tracks is a considerable matter. This particular plant is the only one which has such a problem, as the other plants of the company, and the plants of the other companies operating on the Kaw, are quite near the water, with perhaps one exception. This exception is a plant of the Kaw River Sand Co., and the transportation problem has been met here by pumping the sand on a barge and then towing the barge to an unloading plant on the shore.

The sketch of the profile given below shows that the "tipple" as the loading bin of the plant is called locally, is situated on the Kaw Valley electric line about 900 ft. from the water when the river is at a normal stage. There is a rise of 64 ft. to be overcome as well as the friction head of so long a line. At the beginning of the season each year, when the sand which had "made in" from the high waters of winter and spring was abundant, this was not so difficult with a single pumping as the dredge could be kept close to the bank. But as the season advanced the pontoon line, connecting the dredge with the shore line, had to be extended, so that at the latter part of the season the pump was delivering sand through 1400 ft. of pipe.

With the ordinary speed of the pump, the pipe line velocity accounts for a loss in friction head of 6.5 ft. per hundred. If we add to this the 13 ft. or so, which is necessary for entry head, at the suction and the velocity head of 3 ft., required to keep the water flowing through the pipe, we will have a total head of 170 ft., against which the pump was working.

This is more than the manufacturers of the pump would recommend it for, in fact one of their representatives was quite certain that it could not be made to pump against such a head at all. It did pump against it, however, but the work was never very satisfactory. Moreover the pump was then working at the farthest possible radius, and the sand that could be secured within this radius was often not enough to supply the demand for the season.

After two years of working this way, it was evident enough that to secure satisfactory production at this plant it would be necessary to adopt some sort of a double pumping system; that either a booster or a relay pump would have to be installed to overcome the friction head of so long a line.

This is not the place to discuss the advantages and disadvantages of these two systems at any length but perhaps a word or two should be said about them to give the reason for adopting the relay system.

The booster pump is a pump inserted in a long line. It receives its load directly from the primary pump and passes it on as it receives it, merely imparting more velocity to the load. A relay pump is a separate pump which takes its load from a sump or tank into which the primary pump discharges.

Booster pumps are generally used in large dredging operations, such as are conducted in

The dewatering cone with the pipe from the dredge at the right and the waste water overflow at the left. The relay pump is in the house behind the cone

river and harbor work by government contractors. They have the great advantage that they take the discharge of the primary pump while it is in motion, so they do not have to overcome the entry head and hydraulic head, as the force to do this has already been supplied by the primary pump.

Relay pumps have again to overcome the entry head and hydraulic head and in that way take more power than booster pumps. But in the case of a dilute mixture of sand and water this disadvantage can be more than made up by the opportunity to dewater the discharge of the primary pump before sending it to the relay pump. This is sometimes a very considerable advantage. Without going into too much detail, it may be shown by the fact that it takes more than twice as much power to pump a ton of sand at 8 per cent solids as it does at 15 per cent solids. This was proven by actual tests of power consumed and sand pumped which were made at the plant which is being described.

The opportunity to dewater before repumping was the main reason for installing a relay pump in this case. The hours that the pump had worked during the season and the weights of the carloads of sand that had been shipped showed at once that a great deal more water had been pumped to the tipple than was needed to make the pumping mixture. If this water could be reduced, it was evident that there would be some saving in power.

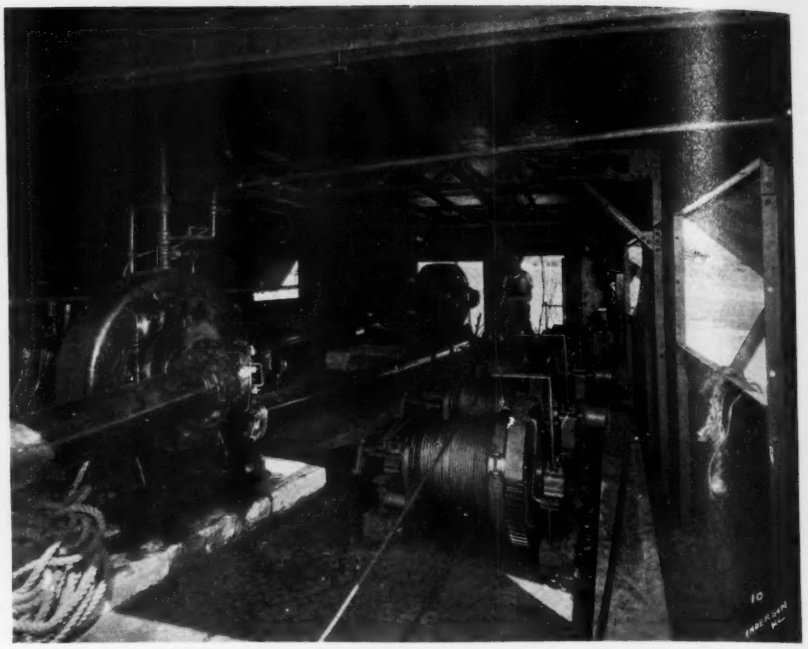
Another good reason for dewatering was that the flow to the tipple would be more uniform. At times the sand from the Kaw river needs some classification, or hydraulic separation, to make it comply with the specifications for good concrete sand. Generally the river does enough classification, but here and there are found beds and layers of finer sand from which a considerable amount of grains 50 mesh and finer in size have to be thrown out in order to increase the percentage of the coarser sizes.

The writer, as consulting engineer, made a considerable study of the problem, in connection with John Prince, the president of the company, for there was more involved than simply dewatering the discharge of the dredge pump. In the first place it was found that the dewatering tank must have a certain amount of storage capacity. It is very often necessary to raise the suction of the dredge to clear it from trash, so that the dredge pump must stop pumping for a short time. It was found that the time required was between 30 and 50 seconds. The tank should therefore hold as much as the dredge pump could pump in that time and something more in order that the relay pump should not suck air. There was also the matter of the rising current in the upper part of the tank. This should be strong enough to flow over clay and very fine sand but should not be strong enough to overflow any sand which was wanted in the final product.

After considering all the factors involved, it was decided that a cone would be the best form of dewaterer, and that it should be 14 ft. in diameter at the top and that it should have a cylindrical section above the cone to provide some storage, enough to keep the relay pump in operation for at least a minute while the dredge pump was clearing its suction.

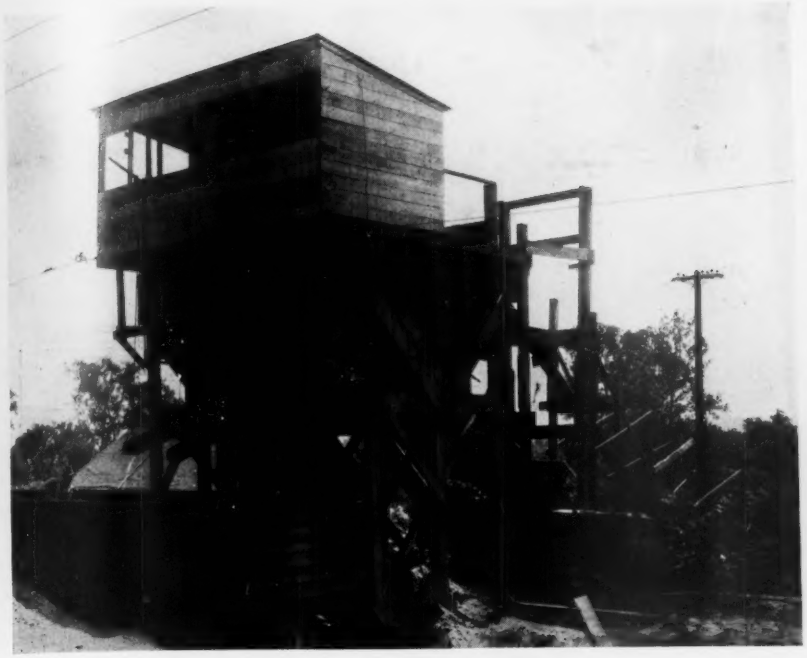
The cone, although it requires extra labor in the way of rolling the sheets to make, is a very rigid form of tank and is easily supported. As the picture shows, it is supported in this case by six angle iron posts attached to an angle iron ring.

The overflow launder around the top of the cone was designed to take all the water that the dredge pump could furnish, for there might be times when the relay pump would stop while the dredge pump was still working.



Interior view of the new steel dredge showing arrangement of belted pump and motor and the drum hoist

Hull and cabin are both of steel. The wooden pontoons are being replaced by steel pontoons as they wear out. The extra life of steel construction makes it cheaper in the end



Railroad side of tipple. The receiving tank is small enough so that unwanted fine sand overflows. Gates are hand-operated

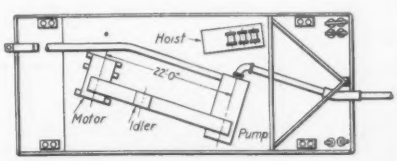
The sand from the Kaw river is practically free from gravel but at times stones are encountered and there is always plenty of trash, such as weeds and the branches of trees, which makes a screen necessary at all times. This screen was placed on top of the dewatering tank so that the overflow water could carry the trash and stones back into the river, the easiest way to dispose of them. A house was placed on top of the tank to shelter the man in charge of the relay pump and screen from the sun and rain.

The relay pump installed was a 10-in. Amsco pump which had seen several years of service. It was a lighter pump than the standard pump that is made today by the American Manganese Steel Co. for the same kind of work, having only a 3½-in. shaft, but it was thought that it would do for the work in hand. It was fitted with a new shaft and runner and a ball thrust bearing. The motor installed was a 50 deg. G. E. motor, nominally rated at 150 hp. It has actually developed 227 hp. and ran at 207 hp. for several hours without showing a rise of more than 50 deg.

This light pump has been able to do the work demanded of it, but only by having several of its parts strengthened and a new thrust bearing installed. The original form of water packed gland had to be changed to a simpler form and in order to free it from vibration the cast iron base was filled with cement.

The pump is driven from the motor by a 16-in. rubber (six-ply) belt. A belt drive was better than a direct drive in this case, as the installation was in some degree experimental and the easiest way to change the speed of the pump would be by changing pulleys. Three different sizes of pulleys were tried before the one was found that would give the greatest practical efficiency.

As is always the case with new installations, there was trouble at the outset. The relay pump ran too fast at times, so that the pump would suck air, in spite of the storage allowance that had been made in designing the tank. At other times, when the dredge was working in very loose sand, the dredge pump would throw up such a heavy load that the relay pump could not push it through the long line and a "choke up" and shut down would result.



Deck plan of dredge showing how balance is obtained with a belt-driven pump

This last condition was met by making changes in the dewatering tank so that the sand could flow to the pump only so fast.

With these changes made, the arrangement is now working satisfactorily. There was not the saving in power that it was hoped the change would show, at the outset, but as the pumping distance increased the saving became apparent. Where the best saving was shown was in those times in which the dredge pump had to pump a dilute mixture. This happens whenever the dredge is working in a part of the river where there is considerable trash, and the sand is scanty. A large excess of water is then pumped by the dredge and the greater part of this is got rid of by the dewatering tank so that the load on the relay pump is lightened. At all times, after everything had been adjusted, it was found that there was some overflow from the dewatering tank.

Conditions at the tipple have been somewhat improved by the change, but the form of classifier is still somewhat deficient. Even with the more uniform flow that has resulted from relay pumping, the flow is still too uniform for the best classification.

At the beginning of this year's operations, the old wooden-hulled dredge, which had served for other seasons' work at this plant, was put in service. This is a belt-driven dredge much the same as the new steel dredge about to be described. Another dredge, with direct connected pump, was also tried. Not only this test but other tests made on the Kaw have shown pretty conclusively that a belt-driven dredge is best adapted to the conditions to be met on this river, especially where there is a liklihood of the dredge being changed from one plant to another.

The installation of this relay pump gave an opportunity to make several pumping tests which have proven to be of the greatest value, not only for this installation but for the whole matter of pumping sand with a centrifugal pump. The information given in text books is exceedingly limited and little of it is adapted to the comparatively small pumps and the high heads that are found in sand and gravel work since it has been obtained from the work of large dredge pumps working at low heads.

The new steel dredge now employed at this plant was designed by John Prince and built by the Kansas City Structural Steel Co. The hull is 54x26 ft. and is of ¼-in. and ⅜-in. plates. The interior framing is of light angle irons with diagonal bracing.

The pump is a heavy duty 10-in. Amsco pump nad it is belt driven by a 300-hp. 50 deg. motor. The belt is of six-ply rubber and is 32 in. wide. A three-drum hoist is provided for swinging the dredge and handling the suction, and a 2-in. pump serves to fill the priming tank which is carried on the upper deck. There are no spuds employed, the dredge being handled by steel cables from the three-drum hoist.

As this deck plan shows, a somewhat different method of placing the machinery has to be employed on a belt-driven dredge from that of a dredge with direct-connected pump. (For a good example of a direct-connected layout, see Rock Products, issue of October 6.) A balance is obtained by placing the pump and motor on opposite sides of the center line and at such a distance that they will balance each other and the hoist and small pump.

This arrangement gives a satisfactory distance between centers for the belt and the machines are so placed that there is plenty of room for the operator to pass whenever necessary to attend to the machinery. One man handles the dredge.

Fossils Tell What Lime Is Good For

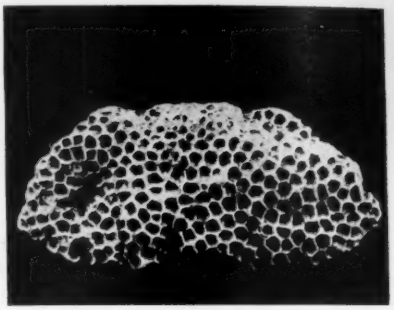
Allwood Lime Co. Standardizes Its Products, Each of Which Is Made From a Different Limestone by Observing Shell and Coral Remains

By Miss M. E. Squire
General Manager, Allwood Lime Co.

THIS article is a valuable sequel to the editor's efforts to tell the lime industry something of the accomplishments of Miss Squire and of her methods (see Rock Products, June 2, 1923). Of course many limestones have no conspicuous fossils, but by microscopic inspection the same fundamental tests may be applied to identifying the physical characteristics of a limestone with the resulting qualities of lime.—The Editor.

AFTER more than ten years of investigation at the Allwood Laboratories, an interesting as well as a somewhat startling fact, has developed, which is, that "Limes having the same chemical content are not always suited for the same use."

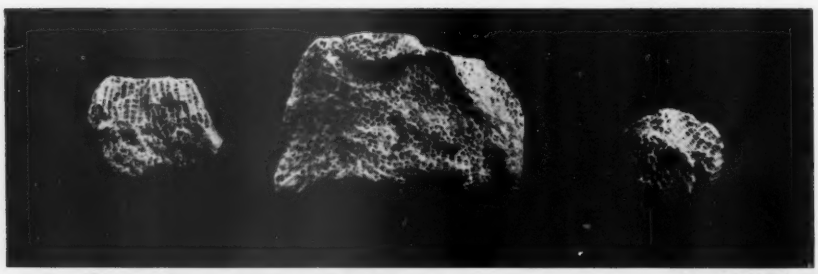
In fact, neither the quality, nor suitability, can be guaranteed by similarity of chemical content. This fact was forced to conviction on the Allwood chemist only after years of experimentation with the Milk of Magnesia Lime, because different batches of this lime, made from limestones of identical chemical contents, and produced under the same conditions of burning, fuel, and finishing processes, showed widely different degrees of solubility, alkalinity and general efficiency, as a neutralizing agent. Indeed, so widely variant were these qualities that the writer was forced to admit that other and unknown factors must be found if a standard product for this purpose was to be produced.



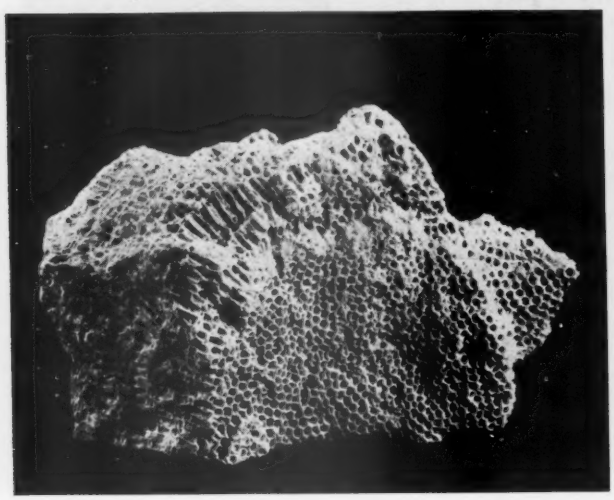
No. 4 much resembles Nos. 1, 2, and 3 but is not used as a "milk" stone

After five years of exhaustive tests, the conclusion was drawn that geological structure and paleontological content were quite as important as the chemical content, in determining a particular lime, for any specific use, or to maintain uniformity of a standard quality of lime. In other words, it became clear to us that limestones having been formed from the fossil remains of numerous kinds of shell animals, different kinds of limestone resulted from different shell remains.

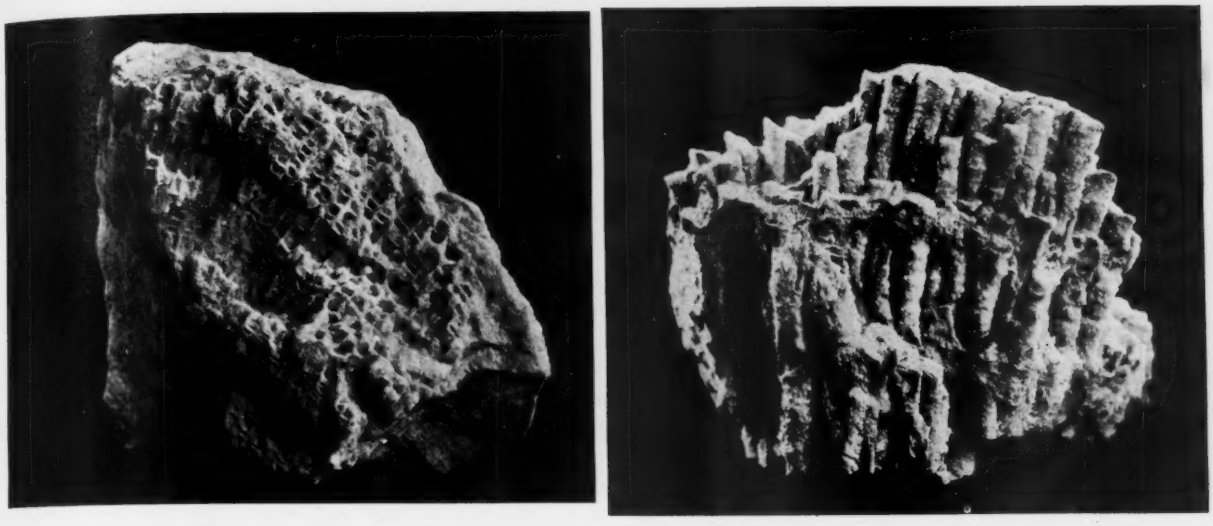
Up to this writing, about fourteen limestones have been isolated, analyzed, iden-



No. 1—The finest of the corals found in limestone used for making "milk of magnesia" lime

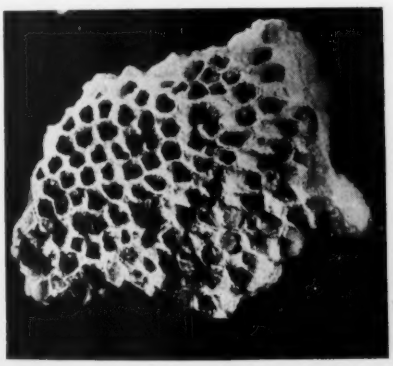


No. 2 (left)—In structure like No. 1 and used for the same purpose. Compare with No. 10 (right), not suitable for chemical uses



No. 3 (left)—This, with Nos. 1 and 2, is used as a "Milk" stone. No. 6, on the right, has the same structure but is coarser and cannot be used for the same purpose, but makes "Lustre Lime"

tified and arbitrarily given trade names in the Allwood quarries, though this by no means exhausts the varieties of stone therein contained. Of our so-called "Milk" stones, there are six varieties or grades, all having practically the same chemical content, but on account of the differences in their efficiency, only the first three grades are ever used to make our Milk



No. 5, like No. 4, cannot be used for the finer chemical purposes. Note that it is like Nos. 1, 2, and 3, except that it is coarser

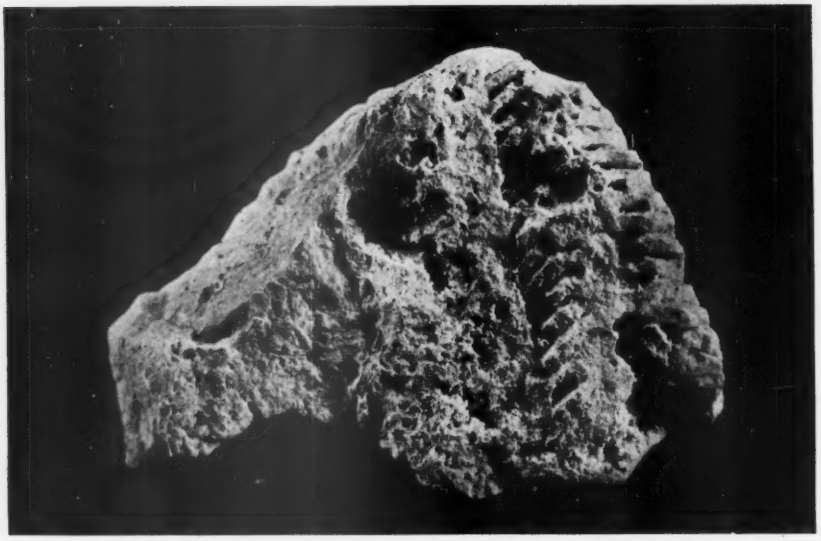
of Magnesia Lime, the perfect neutralizer, "the Lime that is fit to eat."

Figs. 1, 2, 3, 4, 5 and 6 show the fossil remains found in these six grades of limestones. They are extremely rare in the Allwood quarries, which are not, fossiliferous limestones in the usual sense of the word. A blast of several thousand cords of this stone may produce no more than a dozen specimens, though we rarely make a blast without one or more of these "key" stones, as we call them, being found.

Upon casual examination, the differences between 1 and 2 or 4 and 5 are scarcely perceptible, but the difference between the fineness and coarseness of the original coral structure in 1 and 5 or 2 and 6 can be noticed at once. Number 6 is in a class by itself, so to speak, chemically, practically the same as all the other Milk stones. It is utterly impossible to make any but the poorest grade of neutralizing lime from its stone. However, a late discovery (only six months ago) shows this stone is most suitable for another use, a mechanical one. In fact, it is the best stone we have in our quarry to make our so-called "Lustre Lime."

These six specimens alone go far to prove the fact stated at the beginning of this article, that each little pre-historic animal from whose remains a limestone was made, by its nature fixes the particular use for which the lime made from that limestone is best fitted; and other limestones made from the remains of other shell animals may not be satisfactorily substituted to fulfill that use, nor can it satisfactorily fill other uses than that for which, no doubt, the Great First Cause called it into existence, and which only the blindness of man, in reading these imperishable symbols, muddles, and destroys, using indiscriminately all limestones, selling the resultant limes for all purposes, and ever repeating the old false-

The "Vienna" limestone of the Allwood quarries always yields this fossil—No. 7—which, however, is very rarely found



No. 8—The lime identified by this fossil makes only building lime

No. 9—This, like Nos. 8 and 10, identifies a lime that has been carefully studied but has so far shown no other qualities than those of building lime

hood that "lime is lime and nothing else."

Another development was evident when a search among our so-called Vienna limestones was made, for these stones show no fossil remains for months at a time. Close observation, and the gradual training of our ordinary quarrymen to look carefully at the stones as they broke them, has resulted in the finding of several specimens, all those found in these stones being uniform with No. 7.

In all the years of observation, no specimen of any other kind of fossil has ever been found in these so-called Vienna limestones. Several other fossil specimens have been found in other stones (see Figs. 8, 9, 10) and submitted to analysis. After many tests, we have concluded the lime made from these stones is not suitable for any of the four chemical uses that the Allwood has standardized. Hence, it is sold for building lime only.

Inasmuch as there are more than 625 different uses for lime, outside of building lime, we do not dare say that we know anything of the specific and most efficient use of any of these stones, or of dozens of other grades of stones in our own quarry. The colossal opportunity in this field that awaits further research is evident.

The writer does not wish to imply that limestones of any chemical content, which also contain fossils similar to those found in the Allwood limestones will, because of identity of the fossil feature, serve the same use as does the Allwood stones. Having had only experience in the Allwood quarries, it would be fallacious to assume that this was so. What is stated is, that by identifying the stones in the Allwood quarries, first, in the quarry by their fossil remains, or "key-stones," then finding the chemical content to be the same, uniformity of quality, under similar conditions of production, is always assured. In other words, we are able to standardize our products.

A wholly unscientific or secondary result, in which the quarry owners may be interested, is the effect on our quarrymen, whose monotonous task of swinging a sledge, all day and every day, just to break a large stone smaller, has been pleasantly changed. By a very little training, showing discovered specimens, and encouraging the men to look for similar, or other ones, they enter a domain of interest and adventure. For may not the next blow, or the next after, reveal the presence of a long imprisoned "bug," for which "The Old Lady" will pay you twenty-five cents, or maybe a dollar. So the eager joy of search that lit the paths of those ancient seekers for the Golden Fleece lights up, though it may be only dimly, the monotonous days of Tony, Giusippi and Sam.

Lime Doubles the Yield of Some Mississippi Crops

C. T. AMES, assistant director in charge of the branch experiment station at Holly Springs, Miss., reports on the use of lime with Mississippi soils (according to the Memphis, Tenn., *Scntinel)* as follows:

"At this experiment station we have found that the use of two tons of ground or crushed limestone or one ton of air-slaked lime will double the yield of such crops as cowpeas, soy beans, vetch, velvet beans and such legumes. While vetch, crimson and bur clover will grow well on these soils without lime, they are greatly benefited by the use of same.

"In this section we can grow as good red clover as can be grown anywhere by the use of three tons of crushed limestone per acre. Four tons of alfalfa hay were grown for three years in succession on valley land by the use of five tons of limestone per acre.

"In an experiment begun in 1912, where two tons of limestone were used per acre and the soil seeded to oats and vetch each year and followed with corn under which fertilizer was used after the oats were harvested, at the end of seven years the plot growing oats and vetch each year gave a yield of 67 bushels of corn per acre. The average yield of corn per acre before the vetch was grown was 18 bushels. The cost of this crushed limestone, f.o.b. Holly Springs seven years ago, was $1.30 per ton. It is now about $2.30 per ton."

Indiana Sand and Gravel Men Meet

Adopt an Excellent Program for the Coming Year and a New Constitution

THE Indiana Sand and Gravel Producers Association held its annual meeting at Hotel Lincoln, Indianapolis, on November 20 and 21. It was well attended and it was an important meeting. In fact the very continuance of the association might have been said to have depended upon the adoption of a program for the coming year which would carry on and supplement the work which the association has already done in solving certain problems of production and marketing. The report of the program committee was, however, well received and adopted with practically no discussion.

The adoption of this program was the most important work of the business session. For this reason, and because it illustrates so well what the proper activities of such an association may be, the main features are directly quoted:

The Program

Specifications. 1. That the association endeavor to secure at once such modifications in the Illinois highway specifications covering sand and gravel as will meet the approval of the Wabash Valley producers. In connection with this activity it is suggested that a series of laboratory and field tests be devised for demonstrating the feasibility and desirability of making the modifications that may be suggested and that the Illinois highway department be asked to co-operate in conducting the tests.

2. That the Illinois Sand and Gravel Producers be asked to join with the Indiana Association in seeking the proposed modifications in specifications.

3. That the association endeavor to secure a more logical and accurate method of sampling in connection with making inspection of sand and gravel at the plant for Illinois highway work.

4. That the association urge the Indiana Highway Commission to provide for plant inspection of sand and gravel.

Adopting Sand and Gravel Standards

5. That the association continue to assist in establishing A. S. T. M. standards for sand and gravel that will serve as a basis for writing suitable and economical specifications, for both highway and building work.

6. That an extension campaign be instituted among engineers and architects to demonstrate proper and economical specifications covering sand and gravel for use in concrete construction in general.

2. *Promotion.* 1. That a survey be made in each county in Indiana, or any other state recognized as market territory for the members of the Indiana Association, with the purpose of developing all possible business and a report of the survey be circulated to the membership.

2. That a close study be made to discover new uses and markets for sand.

3. That the association endeavor to develop a greater market for gravel ranging in size from ½ to ¼ in.

To Educate the User

4. That where sand and gravel secured from wayside pits are recognized as undesirable, officials or consumers responsible for the use of such materials be visited and urged to substitute washed and graded materials.

5. That the Indiana Highway Commission as well as commissions in adjoining states be induced to use greater quantities of washed and graded gravel for maintenance purposes.

6. That a booklet be prepared to be circlated by the association or the membership giving full information regarding various purposes for which sand and gravel is used and containing such other data as might be of value or interest to the consumer of these materials.

7. That a committee be appointed to investigate and report at the next annual meeting the advantages to be gained by a systematic advertising campaign designed to promote the use of washed and graded sand and gravel.

Legislation Program

3. *Legislation.* 1. That a committee be appointed to map out a program of legislation in Indiana and adjoining states that will prove of benefit in marketing sand and gravel.

2. That the association be active in favoring the proposed $100 000,000 bond issue for highways in Illinois.

It will be noted that the highway specifications and the sampling methods spoken of in this program are those of Illinois more than Indiana. This is because Indiana exports a great deal of sand and gravel to Illinois, especially from those plants which are in the valley of the Wabash river. Some of these plants market nearly their entire output in Illinois. Much of that which is wanted from the Illinois Highway Commission has already been granted by the Indiana Highway Commission.

The committee which drew up this program consisted of E. Guy Sutton, chairman; George V. Miller, J. P. Coyle, D. R. Snyder and E. S. Baker.

The same committee acting as a committee on a new constitution brought in its report which was unanimously adopted. The principal change made was in the dropping of the word Producers from the name of the association so that hereafter it will be known as the Indiana Sand and Gravel Association.

The report of J. A. Shearer, treasurer, showed the association to be in better financial condition than ever before. The bank balance was practically the same as last January, which means a gain of two months dues, November and December, which will be paid in before the end of the fiscal year.

Officers for 1924

A. M. Brown, president; L. R. Witty, vice-president, and J. A. Shearer, secretary-treasurer, were re-elected for the coming year. The directors from the different districts are: No. 1, J. P. Coyle; No. 2, E. S. Baker; No. 3, E. Guy Sutton; No. 4, Abe Hart, and No. 5, John P. Cantlon. The new members on this board are E. Guy Sutton, who replaces H. E. Neal from the third district, and John P. Cantlon, who replaces W. S. Baird from the fifth.

R. C. Yeoman, secretary-engineer of the association, made his annual report, an abstract of which follows:

Increased Tonnage in 1923

The production reported to date for 1923 shows a substantial increase over the corresponding period of last year. It is hoped that every plant has prospered proportionately.

At the last annual convention a plea for economy was made, and the dues were cut one-half. The adiministration has followed the mandate of the membership and practiced economy in every way they could consistently, and are happy to have a substantial cash and book balance to pass on to the next administration.

During the past year Indiana has made a significant change in her highway building policy. The depressed condition of the farming industry made it necessary for the legislature to relieve the farmer of the increasing burden of taxation necessary to build roads by bond issues. The source of revenue for road building is undergoing a change from property taxation to the user of the highways, through increased auto and gasoline license fees. Simultaneously with this change, the centralizing of the control of those main roads which carry perhaps three-fourths of the traffic was further advanced. The State Highway Commission was given largely increased funds, while counties and townships were limited in their spending. The tendency is towards still further centralization and the spending of more of the money by the state. So long as the work is more economically and systematically done, this policy should, and will, continue.

Your secretary has given relatively more attention to the state program than ever before, feeling that it would be best to relax on county and township activities for a period and thus follow public sentiment. The shifting of the tax burden

from property to the road users has long been a recommended policy by the members of this association, and the secretary is pleased to report that he took an active part in the agitation of this policy. Just after the meeting of the legislature last spring, a report was sent to every member of the association, showing the bonding limits of every county and township in the state. As the fortunes of agriculture improve, it will be good business to return to these districts and promote further construction.

Road Maintenance

A study of the maintenance of gravel and stone roads has been made by your secretary, with the idea of preparing educational literature for state and county officials, on the advantages of better grade materials. Mr. Hinkle, the superintendent of maintenance and probably the most powerful single individual in the state in determining its road maintenance policies, will speak to your tomorrow morning on that subject.

200 Yd. Washed Worth 500 Pit Run

The net result of several conferences with state highway maintenance district engineers was recently stated in part in a circular letter. They all agree that graded materials are superior to bank-run materials, but how much is the question. One district engineer made the statement that 200 yd. of prepared material is worth 500 yd. of pit-run material, except in a very few special cases in his district, where the pit-run is equal to any gravel that has been prepared. Another district engineer states that the above is not strong enough in favor of screened materials.

The 400-mile construction program of the Indiana Highway Commission is practically ready to let and the next 30 or 60 days will probably see most of it under contract.

Illinois has a new $100,000,000 bond issue up for ratification. Scattering reports indicate that the people will approve it. While bond issues are not possible in Indiana, and probably not necessary, we cannot say that that method of financing in Illinois is wrong, because their conditions are entirely different. Illinois has practically no system of secondary roads that will permit light travel the year around, while Indiana has more than half of her roads in passable condition the entire year and can afford to continue to build her primary system on the pay-as-you-go plan.

Revised Specifications in Illinois and Indiana

Specifications in both Indiana and Illinois are now undergoing revision and changes are being considered that will assist our industry. In Indiana 5 per cent oversize has been allowed in sand and the 15 per cent tolerance retained.

Inspection has brought up very acutely the question of the proper way of loading a car so as to prevent segregation, or if loaded in the customary way by pyramiding, the question of proper sampling. This problem needs to be thoroughly studied. Proposal has been made to the testing engineers of both the Indiana and the Illinois highway commissions to unite on the sampling experiment, and they have gladly accepted. The details of this cooperation are left to the new administrators.

During the past year your secretary, in conjunction with Mr. Sutton, has taken active part in the committees of the American Society for Testing Materials that have to do with the specifications for sand and gravel. Heretofore this organization has been mainly an Eastern group, considering Eastern conditions, but their specifications are used as standard all over the United States. A recent meeting of Committee C-9, held in Chicago, was the best attended in its history. The records of the meetings of this committee in the past few years will show active interest by your representatives and an adjustment of specifications that will accrue to the benefit of the industry.

Insurance on Plants

Recently I sent out an insurance questionnaire and have received several replies, enough to give an idea of the importance of this subject. I have summarized these replies and have that summary here for exhibition. As explained in my letter, this is only comparative and for any use you can make of it.

This information is private and confidential. The association might possibly benefit the insurance cost of the industry in the following ways:

1. Form a committee to study the matter and collect data and report at the next meeting.
2. The association could group the insurance of all the member gravel companies and wholesale it to one insurance company.
3. The association could establish an agency in the secretary and allow the agent's commissions to go towards helping defray the expense of the office.
4. The committee and secretary could co-operate with the Industrial Board to prevent accidents, secure careful inspection and encourage safety and welfare work.

Dump Truck Insurance

Dump truck insurance is relatively new. The rates are abnormally high because of the lack of experience. One agent reports that he has 120 dump trucks insured, most of which have been carried for about a year. He has had no public liability damage in that time, and the property damage has been less than 15 per cent of the premiums; the collision damages have been less than 10 per cent of the premiums.

The rates on dump trucks by conference rulings now increase with the size and capacity of the vehicle, but experience shows that the risk decreases with the increase in size, because (1) the larger the truck, the slower it moves; (2) the larger the truck, the more expensive it is and the higher grade driver is employed; (3) other vehicles respect the larger size and keep out of its way; (4) the larger trucks operate on an average of 180 days a year, instead of 360 days.

I feel that the above arguments in the hands of a committee and properly presented to insurance companies would prove of great advantage to the membership.

During the past year I have collected some information on the manufacture of concrete products and its possibilities, and have come to the conclusion that it is a field worthy of intensive study and promotion.

Asphalt Sand

Some study has been made of the possibilities of asphalt sand production. While there are opportunities at some plants for a complete asphalt sand, it is by no means general, because of the coarse grading. In every instance where samples have been sent to me I have analyzed them and given in return a report indicating the value as asphalt sand; if the grading needed correction, I have indicated the method of correction. A majority of the washed sand business, however, is going to concrete and gravel roads. Where special machinery can be installed to make a complete asphalt sand successfully in large quantities, it ought to pay. Most plants now furnish the coarser part of the sand to be mixed with a fine sand and a filler.

And last, for the past year I have been working on a suitable map showing the Indiana and Illinois producers of aggregates. I am today presenting you with sample copies, together with a statement of various sizes and costs, and will await your recommendation as to the method in which you want the work continued or completed.

The map was shown to the members. It is an excellent piece of work and will be of great value to everyone connected with the sand and gravel and crushed stone industries.

Mr. Yeoman's work for the association, especially his technical research by which he has shown the value of certain sizes of aggregate in concrete and his work in determining the proper method of car sampling, has made him very well known and he has received flattering offers from large companies to accept positions with them. It is with regret that the association learned that Mr. Yeoman had decided to accept one of these. A note of his new occupation is to be found in another place.

The second day was devoted to papers on subjects of general interest to the industry and discussion. The first of these was on "Concrete Products as a Market for Sand and Gravel," and was given by O. H. Gosswein, field engineer for the Universal Portland Cement Co.

Sand for Concrete Products

Mr. Gosswein began by stating that wherever the market was good for sand it was equally good for concrete products, so the building of a concrete products plant would add a legitimate auxiliary to the sand and gravel plant. He gave some interesting figures on the present production of concrete brick, of which he had a number of specimens made by different machines and processes. It was quite impossible to tell from the face of these bricks whether they were of burned clay or of concrete, except for the fact that the concrete brick were slightly larger.

It takes 108,000 cu. yd. of sand and gravel to make the concrete block production in five Indiana cities. These cities make and consume 7,500,000 block in a year, nearly two-thirds of this production being credited to Indianapolis.

Washed sand and gravel forms about three-quarters of the aggregate used in this way. The tendency is to use more washed material, especially in cities where

blocks are carefully inspected and tested.

As showing the possibilities of the market, Detroit was stated to make over ten million blocks a year and the demand for them in that city is constantly increasing. There are associations of concrete products men in Illinois, Wisconsin and Ohio, and these are constantly improving both the product and the market. Indiana should have such an association as the industry is peculiarly important to Indiana on account of its well known sand and gravel conditions.

Good Aggregate Makes Two Blocks More Per Sack

The grading of the aggregate is, other things being equal, the most important factor of success in making concrete products. If sixteen 8x8x16-in. blocks can be made to the sack of cement, with ordinary aggregate, a specially graded aggregate will make 18 blocks. The grading of the aggregate also determines the "workability" of the mix, which is a most important matter in products work.

Mr. Gosswein said that the products man could afford to pay 35 cents more per yard for an aggregate especially graded for concrete products. The grading he recommended for concrete block was "all through ⅜-in. mesh and 16 to 25 per cent remaining on ¼-in. mesh. He cautioned the producers against trying to run too much of the coarser size (between ⅜-in. and ¼-in.) into the aggregate for concrete brick. The effect was not to weaken the strength of the concrete but to spoil the appearance of the brick. Where the coarse pieces lay along the corners in great abundance they were apt to "spall off," so that the pile of brick would look like a pile of culls.

Importance of Water Content

He said that the importance of using the right amount of water applied to concrete products as well as to other concrete work, but his difficulty had been to get the makers to use enough water. They were apt to get the mix too dry. He pointed out a fact that everyone interested in concrete should know, that a 10 per cent excess of water will lessen the strength of the concrete 16 per cent but a 10 per cent decrease from the normal amount of water would lessen the strength of the concrete 28 per cent. In other words, it is safer to use a little excess of water rather than a deficiency.

Taking up the financial points of the business, Mr. Gosswein said that a 25,000 brick plant was the smallest size that could be made to pay. The cost of such a plant would be about $20,000. An output of 2500 brick for each man employed could be counted upon. In Indiana the cost of making common brick should be between $11 and $12 per thousand.

A. H. Hinkle, of the Indiana State Highway Commission spoke on Gravel for Road Maintenance. He said the commission had been keeping costs on definite pieces of road until they now had the comparative figures for different grades of gravel and crushed stone. Unfortunately, some data was still lacking on the density of traffic on different stretches of roads and time had not permitted the commission to collect and arrange the figures for a complete study.

The ideal gravel for road maintenance depends on whether it is to be used in dense or ordinary traffic and whether it is to be used to surface an old road or build a new one. The best gravel for all purposes he described as 1-in. down in size, with enough stone dust to make the necessary binder.

The percentage of voids is important as the lower the percentage the more tightly the material will pack and the greater resistance it will offer to the cutting of the wheels.

The best binder he had found to be about 25 per cent of finely crushed limestone. Clay and silt are not desirable as binders if the traffic is at all heavy. With a clay binder one may make a good summer road but it will go to pieces under heavy traffic when the frost is coming out of the ground in the spring.

Clay No Good in Modern Roads

He condemned, especially, the following of the old text books on road building, in which it is stated that clay, up to 20 per cent, does no harm. This might have been true in "horse and buggy" days but it is not true for modern traffic and clay should be kept out of our roads.

Mr. Hinkle is strong for washed and crushed material. He pointed out that the value for maintenance rose with the increase of crushed material in the gravel, but said that the greater part of this value was obtained in adding the first 50 per cent of crushed material to the gravel. He could not emphasize too strongly the value of crusher dust as a binder.

An interesting point he brought out was that gravel actually wears out under traffic and that new gravel must be supplied to present unworn surfaces. That is why roads which apparently have plenty of gravel on them will corrugate badly. The gravel is worn out and an application of new gravel must be made before the road will "set."

The latter part of Mr. Hinkle's address had to do with the technique of maintenance. He pointed out that the cheapest road to maintain is not necessarily the cheapest road to the public. The cost of the road may be paid in the wear and tear of cars as well as in taxes.

S. C. Hadden, secretary of the Allied Motors Commerce, of Indiana, gave another talk on roads which was highly interesting, as showing the future of roads in Indiana. The state has a well-defined program for hard surfacing 400 miles per year of roads, working on the "pay as you go" plan. His talk was largely on co-ordination of the motor truck with other systems of transportation and the other systems of transportation.

Good Business to Bond for Roads

After lunch H. F. Clemmer, of the Illinois State Highway Commission, discussed the financing of roads in Illinois in a most illuminating way. He showed that it was as good business for the state to bond and build roads to use while it was paying for them, as it is for a man to build a house and live in it while he was paying off the mortgage.

Mr. Clemmer had some excellent charts showing the estimated increase in population and the income from licensing vehicles for the life of road bonds. The increase in population curve for 70 years is practically a straight line, which would indicate that a population of ten million may be expected by 1960. It is supposed that we will reach a saturation point in cars by that time of one for each five persons in the state (Iowa has one to every 4½ persons). From these he deduced that the license fees of cars now amounting to $10,600,000 yearly, would be ample to pay interest on bonds and to leave one-half the income for emergency and maintenance.

More City Paving Next Year

L. S. Trainor, district engineer of the Portland Cement Association, spoke on city street construction, which provides no small market for sand and gravel. In 1909 only 117,000 sq. yd. of such paving was laid down in Illinois. Last year this figure had risen to two and a quarter million yards and next year four million yards will be laid. In other words, the sand and gravel used in city paving in 1924 will be almost double that used in 1923. One-third of this aggregate will come from Indiana producers.

Mr. Trainor said that new legislation should be passed permitting greater latitude in concrete construction, so that the engineer could design the concrete mix after the aggregate was on the job. He was especially strong for the use of washed material and recommended advertising campaigns like that so successfully conducted at Danville, to insure the use of only washed material in city paving. ing.

In closing Mr. Trainor advocated a joint association of Illinois and Indiana producers. He also noted that Illinois specifications for aggregate are beginning to be used as standard by engineers everywhere.

An excellent lunch was served on both days, by the association, to all who attended. Prof. R. A. Talcott, who teaches dramatic art at Butler University, gave an excellent half-hour entertainment at the second day's luncheon.

Preparing Ocala Limestone and Flint for Road Materials

Limestone for Road Bases, and Flint for Aggregate an Important Industry in a Florida City. Two Companies Operate Several Small Plants Each

By Geo. M. Earnshaw

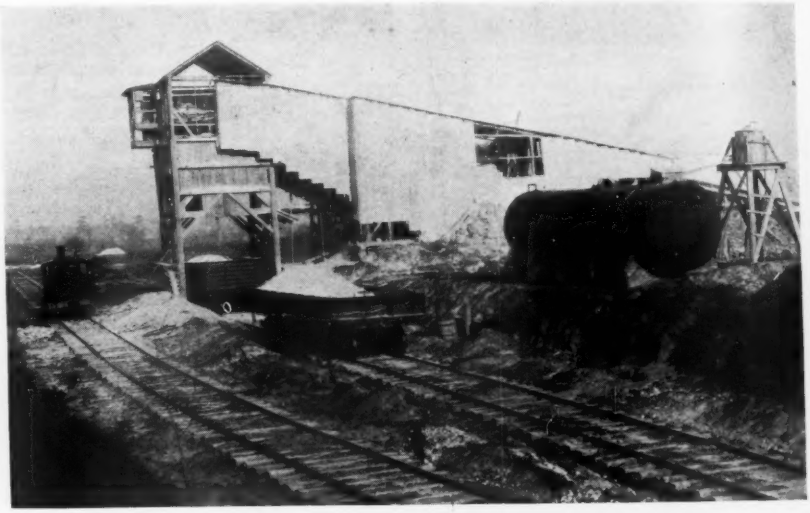
THE value of Ocala (Fla.) limestone as a road-building material has been known to the natives of the section in which it is found for some time. The cementing properties, which all crushed limestones have to a greater or less degree, are very strong in this "limerock," as it is always called locally. With exposure to the weather it was found that this soft and porous rock would harden into something like concrete.

This property of the rock was not put to much use until the value of hard roads began to be appreciated throughout the state. The first experiments with it were made in building sidewalks and private roadways, and soon after this roads were built from township to township and from county to county. But the methods at first employed were more or less experimental and haphazard. The old roads were merely covered with a few inches of limerock and then rolled. Even this was a great improvement and taxpayers considered their money well spent.

Ocala limestone is a very soft and porous, light gray to white nummulitic stone, usually white as marble. When fresh it may be as easily broken as lump lime, but exposed surfaces in the rock are hard, due, it is said, to the deposition of calcium carbonate from the waters emerging along the outcrop. It is found in Marion county and adjacent counties. The average deposit varies from 30 to 100 ft. in depth, with an overburden 1 to 4 ft. deep, of yellow sandy loam. Fossils occur throughout the greater portion and flint boulders are found in all the deposits. The limestone itself is an almost pure carbonate of lime, the following analysis being an average: Calcium carbonate, 99.15; iron and alumina, .35 and insolubles .30.

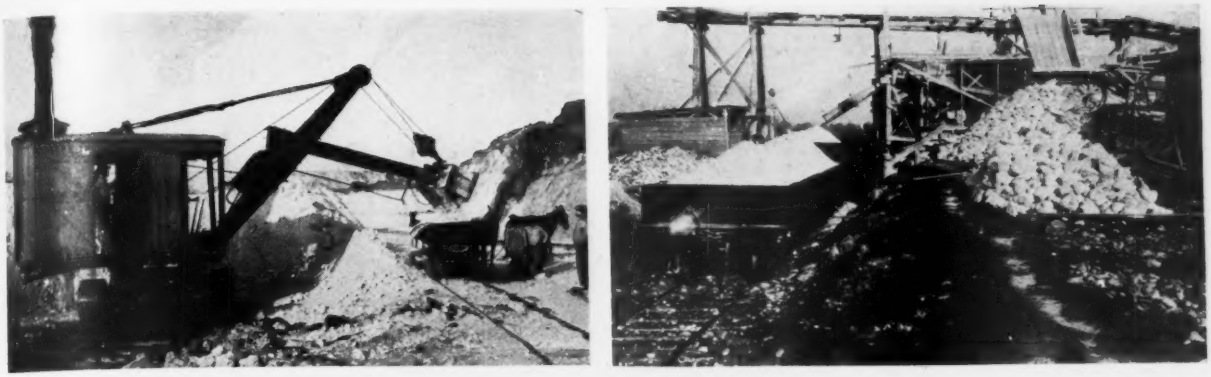
This "limerock" has been quarried for several years and burned in pot kilns. The quality of lime produced is of the highest grade and is equal to that burned from ordinary limestone. For a long time this was the only use made of it and three or four companies were engaged in only burning lime, having no belief in the possibilities of the stone as a road-building material.

When the experiments in road building were successful, additional companies were organized and several quarries opened. Perhaps the most aggressive



One of the lime-rock crushing plants. The tank on the right is for fuel oil

The quarry which serves the plant above. The whiteness of this lime-rock makes it look like a snow bank



Left: Ten to fifteen cars make an average day's "digging" for this machine. Right: There are no bins in this flint-crushing plant, the product going directly from the crusher to the cars

man in this movement was C. G. Rose, formerly an engineer with the F. G. and A. C. Proudfoot Co., of Chicago. Mr. Rose was in Florida in charge of one of his company's projects at the time of the limestone boom, and after carefully analyzing the situation, recognized the possibilities of the use of this local material for road building. He was instrumental in bringing about the formation of the Ocala Lime Rock Co., of which he was made secretary and treasurer.

New Equipment

This new company leased a piece of limerock land on which was an old lime plant that had not operated in several years. Use was made of part of the lime plant by mounting a crusher at the end of the incline and special bins over the loading track. One of the first things Mr. Rose did was to throw out the old equipment and, in so far as was possible, replace it with modern equipment. Two-way, all-steel dump cars and revolving shovels were put in service and soon the plant was producing 10 to 15 cars per day. This was done with one steam shovel, 10 cars, 2 teams of mules, a locally-manufactured 18x36-in. roll crusher, driven by a 60-hp. oil engine, and 10 men.

Flint screenings are re-screened over a ⅛-in. screen to make a clean grade of roofing gravel

Gradually the company took over other properties and built additional plants. These were built practically along the same lines but with some improvements over the first one. Three stationary plants and one temporary unit are now in operation and their combined output is approximately 45 to 50 cars per day. Two of these plants are at Kendrick, one at Santos and one at Bellview, Fla.

Flint in the Deposits

One of the only handicaps or difficulties in the production of this material is the removal of flint which occurs in ridges in the deposits. As the crushers are of light weight and designed to crush only soft materials, it is necessary that the boulders be removed from the material before it is fed to the crusher. This, of course, has to be done by hand, which means the employment of 2 to 4 extra men at each operation. This company has not installed equipment to crush the flint, as it is sold as riprap for ballasting railroads and also for county road projects.

From the appearance of Ocala limestone, it is hard to believe that it would ever make a hard-surfaced road. Hence,

Left: Florida type of "locomotive" and engineer. Right: An unusual deposit that has to be worked in two benches

The laborer is holding one of the flint boulders found in all these deposits

it required considerable explanation, as well as demonstrations, to finally establish in the minds of state-highway officials, its merits as a road-building material. This was at last accomplished, however, and now Ocala limestone is specified in the majority of state-highway contracts.

But the roads are not built now as they were in the early days when the use of this material for this purpose was first discovered. Specifications require that the subgrade be prepared in the same manner as though an all-concrete road were to be built. The crushed (practically pulverized) limerock is then laid and rolled to a uniform thickness and width. After receiving the proper amount of rolling, the road is kept free of traffic and allowed to settle and to be exposed to the sun and rain. This is the curing process. The road is then very hard and tests have shown that it will withstand a considerable amount of rough usage.

The most recent methods of road building with this limerock include the laying of a 3-in. surface of asphalt or macadam on a completed limestone base, as it has been shown that the limestone serves best as a base.

The flint-crushing industry is similar to that of the limestone. The plants are similar and, because of the fact that the deposits are of no great extent and are widely scattered, the plants are numerous. In this field, the A. T. Thomas Co., of Ocala, is the big producer, and it operates five plants, which produce the greater portion of the coarse aggregate used in central Florida. As gravel and hard limestone are scarce in this section this product finds a ready market the year 'round.

This flint is a well-known member of the silica family, which has a hardness of seven on a scale in which the hardest mineral—the diamond—is ten. When crushed it breaks into sharp-cornered pieces of varying sizes.

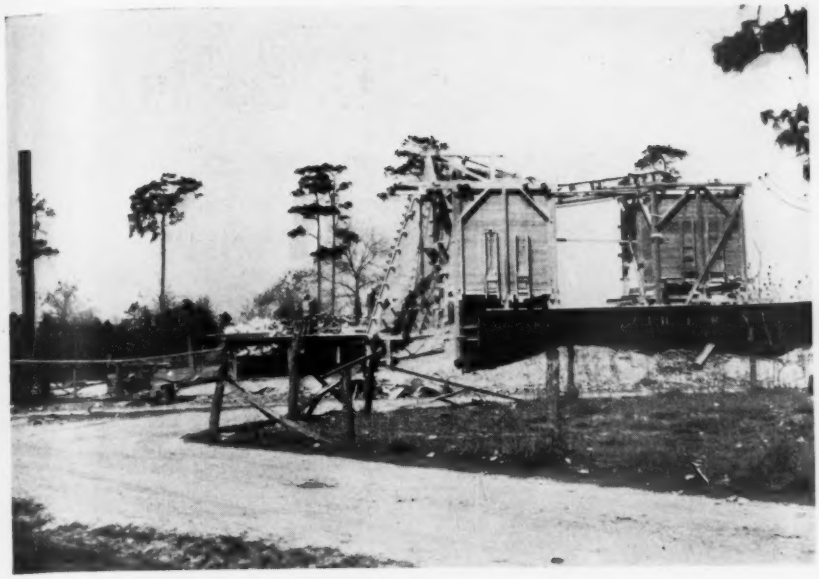
To quote Mr. Thomas, president, who showed the writer two of his operations, "when you have seen one of the plants you have seen them all." The two visited were identical. Each contains a 10x 16-in. jaw crusher driven by a 25-hp. steam engine with a 40-hp. horizontal boiler; a 10-in. by 30-ft. chain-bucket elevator; a 36-in. by 8-ft. revolving screen; a 14-in. by 25-ft. belt conveyor, and a 24-in. by 6-ft. revolving screen.

The larger screen is made up of two

C. G. Rose, secretary-treasurer of the Ocala Co., and largely responsible for the development of the lime rock industry

sections, one of which is perforated with 1¾-in. holes, and the other with 1-in. holes. This screen is fitted with an outer jacket of ¼-in. perforations. The product of the 1-in. section is chuted direct into a bin and is sold as ¾-in. stone; that passing through the 1¾-in. sections is discharged on the conveyor, which empties it in a second bin. The product of the outer jacket is chuted to the small revolving screen, which is fitted with a woven-wire screen with ⅛-in. openings. In this way three distinct sizes, exclu-

Left: One of the latest plants provided with two inclines to insure continuous operation. Right: A six-mile stretch of excellent road made with raw limestone



Typical flint-crushing plant. Its average output is two cars per day

The flint boulders which are hauled in a wagon to this platform are fed to the crusher by hand

sive of dust, are produced. The bins, which are of 30 tons capacity each, are fitted with gates for side loading into railway cars or trucks. A considerable portion of the output is delivered by truck.

Perhaps the most novel part of the flint-rock operation is the method of obtaining the flint. In the Ocala district, flint is found in small pockets on top of the ground in either wooded or open sections. As land is cultivated, the farmers remove the boulders and leave them along the edges of their fields. The company collects them with wagons and teams and takes them to the nearest plant. In addition, of course, the company employs men to mine flint from its own land, paying them by the cubic foot.

Thus it is easy to see that a plant of any great size would not be appropriate. By having a small plant, moving and setting up in a "fresh" section, when a field is worked out, the work is simplified. It is surprising to see these small operations produce two cars each per day.

The Ocala Lime Rock Co. and the A. T. Thomas Co. are classed as two of the most important organizations of the rock products industries in Florida, and are playing important roles in the development of the entire state. Messrs. E. W. Ellis, president, C. G. Rose, secretary-treasurer, and Dan Cleary, superintendent, are the directors of the Ocala company, and A. T. Thomas is sole owner of the A. T. Thomas Co.

Theoretical and Actual Voids

WRITING to the Engineering and Mining Journal Press, R. D. Perkins, of Los Angeles, says:

Sir—Referring to the article by Donald H. Fairchild, your issue of Aug. 4, regarding the weight per cubic foot of steel balls, it is noted that he uses the theoretical demonstration of piling spheres of equal dimensions. This demonstration was used many years ago in connection with interstices in sandstone, with the same result, 26 per cent voids for spheres of the same size. It is believed that G. F. Becker was the author in mind.

In the second edition of 1911, of "Concrete Plain and Reinforced," by Taylor and Thompson, on pages 168 and 169, a similar demonstration is given in the following language: "The fact that the percentage of voids in a mass of equal spheres symmetrically piled in the theoretically most compact manner is independent of the actual diameter is simply a geometrical proposition, evident without demonstration by inspection of Fig. 58." The result is 26 per cent voids. However, extending the quotation may give a practical view of the question: "In actual experiment it has been found that while the percentage of voids is uniform regardless of the size of the spheres, it is impossible to pour spheres into a measure so that they will arrange themselves symmetrically, and the rather astonishing result has been reached by Mr. Fuller (see p. 185) that 44 per cent is the smallest percentage of voids which can be obtained with equal perfect spheres, no matter what may be their actual diameter or the size of the receptable." Mr. Fuller on page 185 says, "This is assuming that every particle is placed exactly in its assigned place, but it is inconceivable that such an arrangement should take place under practical conditions, and in fact numerous trials by the writer with large masses of equal-sized marbles have demonstrated that they cannot be poured or tamped into a vessel so as to give less than 44 per cent voids."

May the foregoing not suggest that further practical experiments should be made before attempting to correct texts, notes and catalogs.

Fabrication of Domestic Talc

A STUDY of the methods of beneficiation and fabrication of domestic talcs into electrical insulator shapes is being made by the Department of the Interior, in co-operation with the American Lava Corp., at the ceramic experiment station of the Bureau of Mines, Columbus, Ohio.

Similar materials are used largely in Europe for this purpose, but due partly to a lack of information in regard to what have been held as secret processes and partly to a lack of properly prepared raw material, the American industry has been backward in its development.

Kentucky's New Asphalt Plant

Ohio Valley Rock Asphalt Company's Recently Completed Plant at Summit, Ky., Rated at 750 Tons Per Day—Company Owns or Leases 30,000 Acres Bearing a Sandstone-Base Asphalt of High Bitumen Content

By George M. Earnshaw

THE Ohio Valley Rock Asphalt Co. has recently completed a modern, well-designed and substantially-constructed plant at Summit, Ky., for the reduction and grading of sandstone-base asphalt obtained from an unusually large deposit in that section. Summit is in Hardin county, 58 miles southwest of Louisville on the Illinois Central railroad, in the heart of one of Kentucky's richest asphalt sections.

The material is similar in physical analysis to other Kentucky asphalts, being a sandstone, which was originally saturated with petroleum, each face of every individual grain of sand being coated. This later formed a cemented mass, the petroleum having been oxidized and the lighter oils driven off by exposure to the air. The rock is really an oil sand which has been brought to the surface and which, after exposure to the elements, forms a mass which can be separated only by crushing and grinding.

The new company owns, or has under lease, approximately 30,000 acres, an extensive portion of which has been tested and found to contain rock of such quality and in such quantity as to justify the building of a modern and elaborately designed plant. In prospecting the property diamond drills were used and holes were put down every 100 ft. in squares, with a hole in the center of each square. The present quarry was systematically tested in this way and the summary of the tests showed that the percentage of bituminous matter varies from

This shows both the stripping and quarrying operation. Note the skip-box in front of shovel; the inferior material is loaded into it by hand and when full is dumped into a car and hauled to the dump

General view of plant from west side. Note fuel-oil tank. The machine and blacksmith shops and laboratory are in the building at the right

Drilling a stripped area. Holes are drilled 7 ft. apart in rows 6 ft. apart

Partial view of quarry showing one of the hand-loading crews

5 to 14 per cent. In testing the material before shipping (after it has been crushed and ground) samples are obtained by a mechanical sampling device as the material goes into cars and these are thoroughly mixed. From this mixture samples are taken for analysis.

Two quarries, adjoining each other, have been opened, one having a face of 800 ft. and the other a face of 300 ft. in length. The deposit has an overburden of soil and sandstone averaging 13 ft. in thickness; the deposit itself averages about 14 ft. Stripping is done with a revolving Erie steam shovel equipped with a ¾-yd. dipper and crawler tread. The overburden is hauled to the dump in 4-yd. Western cars by a 14-ton Davenport locomotive.

Primary drilling is done by two Ingersoll-Rand Model X-70 wagon drills with 8-ft. feeds, while pop-hole drilling is done by two BCR-430 Jackhamers. Holes drilled by the large drills are spaced 7 ft. apart in rows 6 ft. apart; blasting is done with 40 per cent gelatin dynamite.

Most of the loading in the quarry is done by hand so that inferior material can be picked out and not allowed to go to the plant. However, some of the rock is loaded by a second Erie shovel, but several men are in attendance in the pit in front of the shovel to make sure that only the good rock is loaded. In addition to a general quarry superintendent, there is an inspector whose sole duty is to supervise loading and see that inferior material is not sent to the plant. The chief qualification for this position is experience and in choosing its man, the Ohio Valley company selected one who is a native of the Kentucky asphalt fields and who has been engaged in the production of the product for more than 20 years.

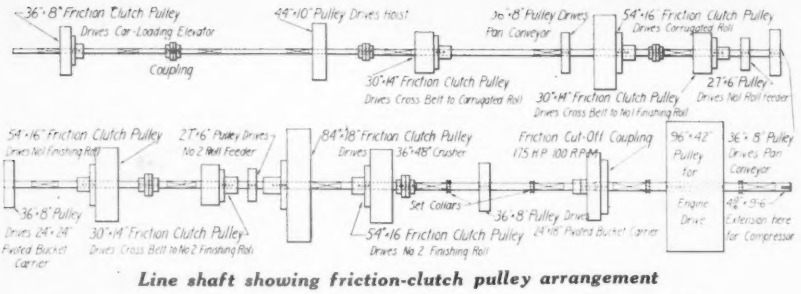
This gives an idea of the richness of the deposit. The pure bitumen on the stick was taken from one of the drill holes

The Plant

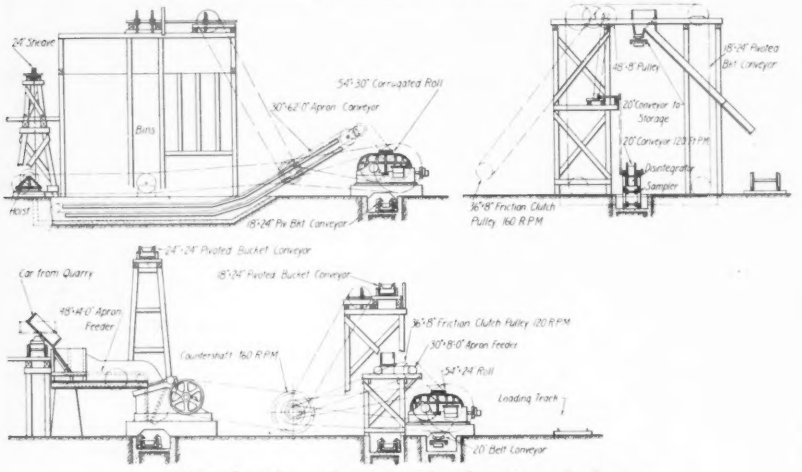
The plant is served by an incline, at the bottom of which is adequate storage space for a large surplus of loaded cars. The incline is approximately 400 ft. long with a 10 per cent grade. Cars are pulled up two at a time—a total weight of about 28,000 lb.—at the rate of 250 ft. per minute, by a single drum Flory hoist, driven from the plant's line shaft and controlled at the top of the trestle by extended levers.

The initial breaker is a 36x48-in. jaw crusher fed by a 48-in. by 14-ft. Sheridan grizzly feeder, fibre-clutch controlled from the crusher. Both of these machines, as well as all other crushing and grinding units in the plant, were manufactured by the Traylor Engineering and Manufacturing Co., Allentown, Pa. The crusher is set to discharge at 5½ in. and its product empties into a 24x24-in. pivoted-bucket carrier of 32-ft. 6-in. centers on the horizontal and 31-ft. 6-in. on the vertical. This carrier travels at the rate of 50 ft. per minute and has a rated capacity of

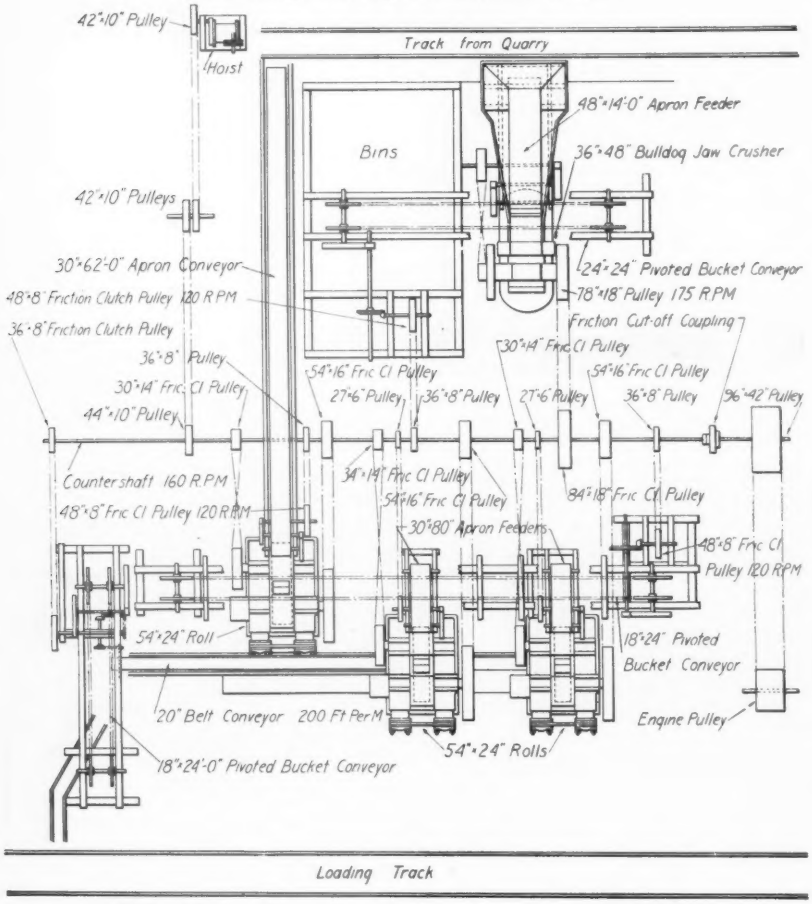
The plant as viewed from the east side



Line shaft showing friction-clutch pulley arrangement



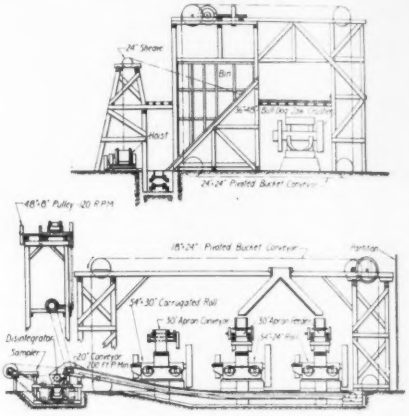
Two drawings showing side elevation of plant



This drawing shows the entire plant, excepting the engine

120 tons per hour. It empties directly into either one of two bins of 150-tons capacity each. These bins have 45-deg. bottoms which are lined with ¼-in. steel plate to insure against sticking.

The company's engineers experienced considerable difficulty in designing a gate for the bins that would prevent choking and that would, at the same time, insure a conservative flow. One of the accompanying photographs shows the style gate resulting from much experimenting. The crushed rock flows through the gates directly to a 30-in. steel pan conveyor of 60-ft. centers, running 50 ft. per minute. It, together with



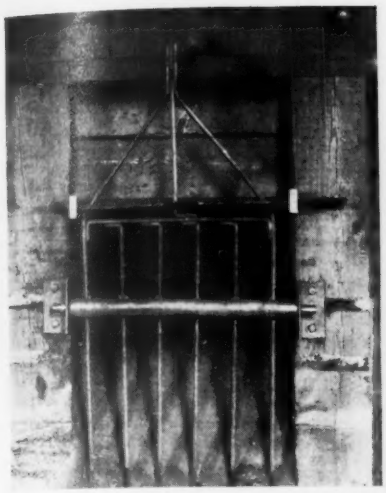
End elevation showing relative positions of all major equipment

the pivoted-bucket carriers, was furnished by the Stephens-Adamson Mfg. Co., Aurora, Ill.

The pan conveyor empties into a 54-30--in. Type AA corrugated crushing roll of high carbon cast steel. This machine crushes to 1½-in. and discharges into a 24x18-in. pivoted-bucket carrier of 62-ft. centers on the horizontal and 29-ft. on the vertical. It travels at the rate of 50 ft. per minute and has a capacity of 120 tons per hour.

Two 54x24-in. finishing rolls (also of the standard Traylor AA type and equipped with a fleeting device) receive the material from the pivoted-bucket carrier by way of individual 30-in. by 8-ft. steel apron feeders. These machines reduce the material to the size of the sand grain and discharge it on a 20-in. belt conveyor of 62-ft. centers, running 200 ft. per minute. At the end of this conveyor is an automatic sampler which catches part of the belt's discharge at regular intervals. The sampler empties into a cart in which the sample is hauled to the testing laboratory. The belt conveyor empties directly into a second 24x18-in. pivoted-bucket carrier of 27-ft. centers horizontally and 36-ft. vertically. This carrier likewise has a speed of 50 ft. per minute and can handle 120 tons per hour. It empties into a steel-lined chute feeding directly into railway cars.

The entire plant is powered by one unit, a 300-hp., Type Y, six-cylinder, semi-Deisel, oil engine, manufactured by Fairbanks-

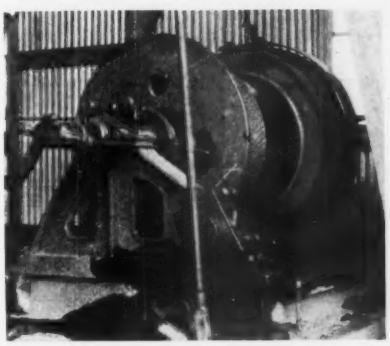


This is the only kind of gate the engineers have found to work satisfactorily on the 45-deg. bottomed bins

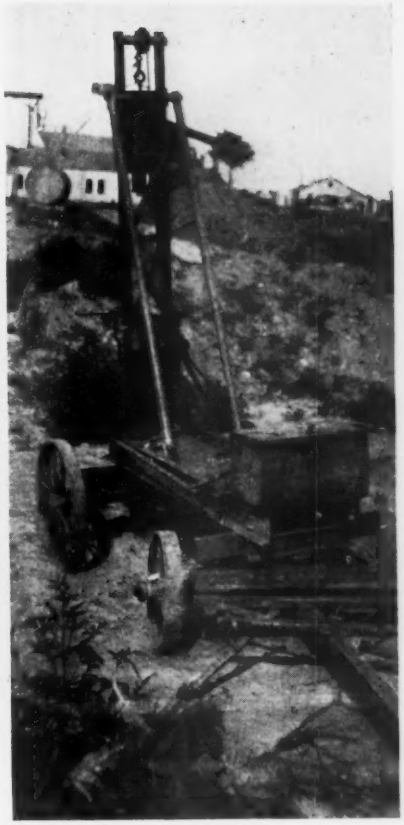
Morse & Co. While no actual records of the engine's fuel consumption have been kept, officials declare that it has operated within the guaranteed maximum consumption, which is ½ lb. of oil per horse-power hour. Consequently, the cost per horse-power is as cheap, if not cheaper, than an equivalent amount of electric power. One of the company's engineers has estimated that, to individually drive the various units of the plant with electric motors, it would require a total of more than 600 hp. This estimate is based on information obtained from several of the larger manufacturers' recommendations and ratings.

The line shaft is one of the most interesting features of the plant inasmuch as its design is something new for the rock products industry. Through friction clutches, it is possible to operate any unit of the plant individually. Besides the main drive pulley, which is 96 in. in diameter with a 42-in. face, there are 15 pulleys, eight of which are of the friction-clutch type. These are for controlling the following machines: jaw crusher, corrugated roll, two finishing

The hoist is controlled on top of the trestle so that the operator has a clear view of the cars from bottom to top



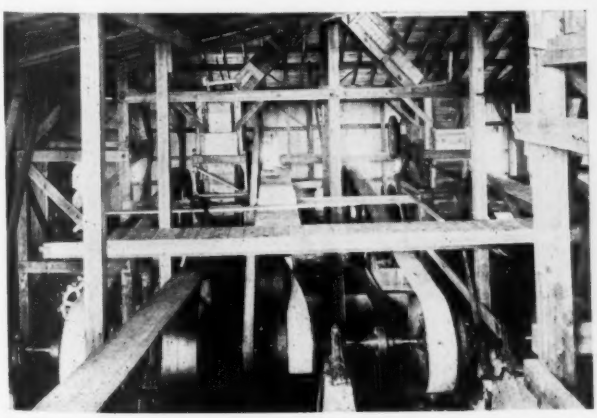
This little single-drum hoist is set up on the ground floor under the trestle

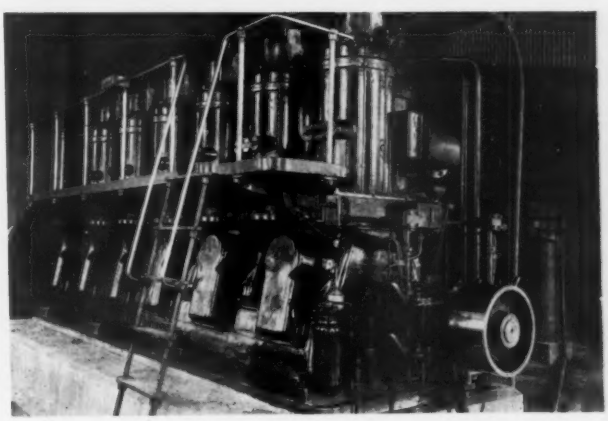


One of the new wagon drills. It has an 8-ft. feed

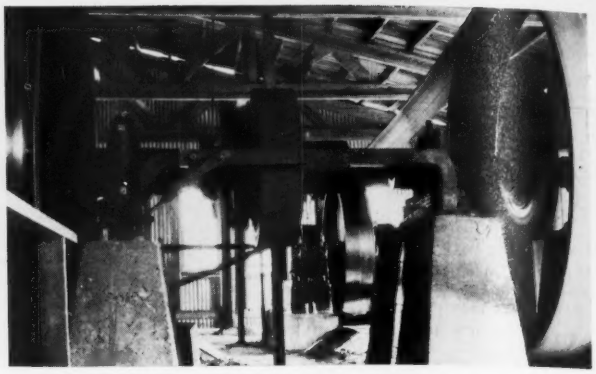
rolls, cross belts to finishing rolls, cross belt to corrugated roll and pivoted-bucket carrier for loading cars.

The first section of the shaft, on which the drive pulley is mounted, is 5 15/16 in., as is also the engine shaft which travels at the rate of 257 r.p.m. A 9-ft. 6-in. extension of 4 15/16-in. shafting is provided for driving a Chicago Pneumatic Tool Co. duplex compressor. A friction cutoff coupling connects the first section of 4 15/16-in. shafting with the larger section where it is reduced to 100 r.p.m. There is a total of





Interior view obtained from the jaw crusher. Note how the feed to the two finishing rolls is split; right, the 6-cylinder semi-Deisel oil-burning engine. Its guaranteed maximum consumption is ½ lb. of oil per horsepower hour



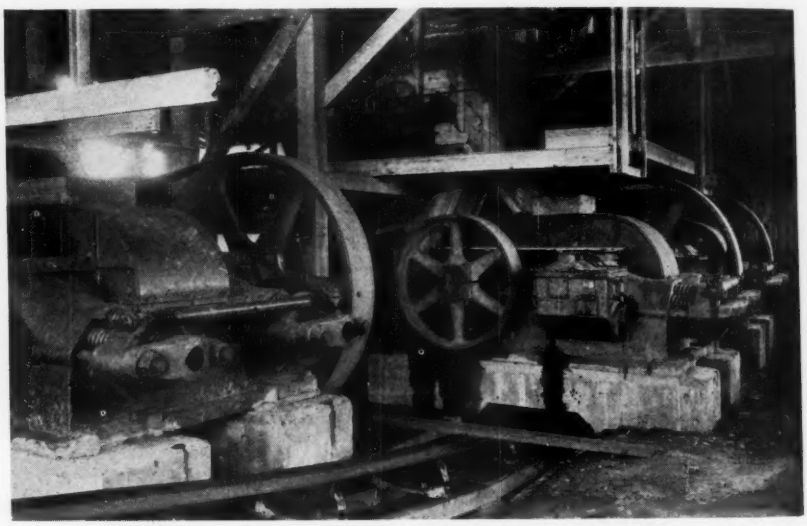
One of the pivoted-bucket carriers. The buckets, upon reaching the dumping point, turn completely over; right, the first section of the line-shaft as viewed from the engine. The compressor is in the background

A peep into a loaded car. The finished material is 5/16-in. and down

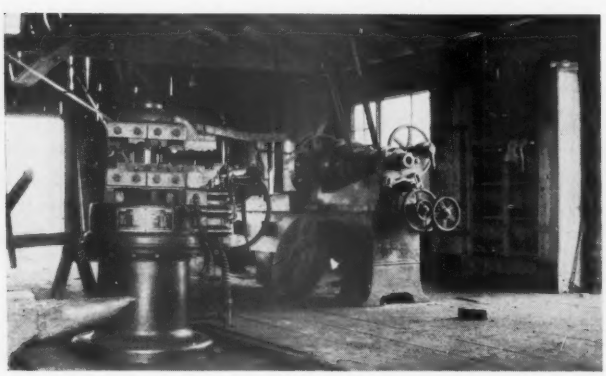
109½ ft. of shafting, ranging from 2 15/16 to 5 5/16 in. All bearings are of the ring-oiling type, having ball and socket pillar blocks with sole plates and wedges. The shafting, bearings, pulleys and clutches were furnished by the T. B. Wood's Sons Co., Chambersburg, Pa.

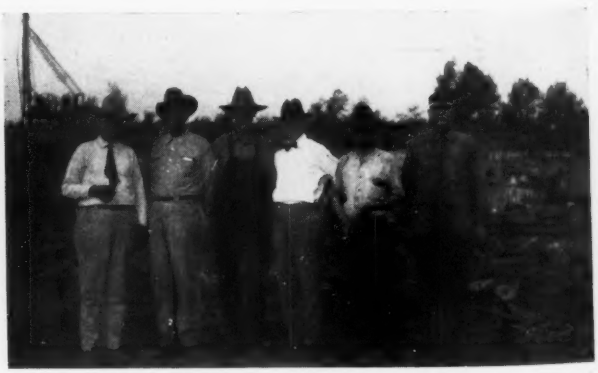
The water supply for the operation is furnished by a Barnes 4x5 piston-pattern pump driven by a Novo gasoline engine. The water is pumped through 2000 ft. of 2-in. pipe line to a 16,000-gal. wooden tank located on top of a hill a few hundred yards from the plant.

On account of the distance to any large town, the company finds it necessary to maintain a modern and well equipped machine shop adequate for repairing practically any breakdown in any part of the operation. Its equipment includes a 6-ft. lathe with 26-in. swing, a power saw, a drill press, two emery wheels, a Model 50 "Leyner" drill sharpener and a No. 25 Ingersoll-Rand drill



The machine at the left is the 54x30 corrugated roll and the two at the right are 54x24 finishing rolls. The 30-in. belt carries the finished product from the latter to a pivoted-bucket carrier





Left, interior of machine shop showing drill sharpener in foreground; right, the operating staff. Left to right: Dover Williams, vice-president and general manager; W. C. Spriggs, quarry superintendent; J. W. Vincent, inspector; C. R. Bourland, chemist; S. E. Puckette, civil and construction engineer, and Charles Turner, plant superintendent

heater. The latter is of the latest type and is equipped with an oil-burning furnace which uses air for atominzation. The shop's equipment takes its power from a 10 hp. Fairbanks-Morse oil engine using the same kind of oil that is used by the big engine in the plant.

The plant proper requires but 10 men to operate. These are stationed as follows: one at engine, one at hoist, one to feed crusher, one in front of bins, one at sampler, one to take care of the three roll crushers, one for oiling, two for loading cars and a foreman. In all, however, there are 125 men on the payroll. The operating staff includes: Dover Williams, vice-president and general superintendent; Ernest Moats, superintendent; S. E. Puckette, construction and civil engineer; William C. Springs, quarry superintendent; Charles Turner, plant superintendent; J. A. Marshall, chemist; J. W. Vincent, inspector; and E. F. Heil, chief clerk and assistant secretary and treasurer. F. D. Wood, president, and S. O. LeSueur, secretary and treasurer, have their offices in the Starks building, Louisville. Rodman Wiley was the company's consulting engineer during the plant's construction, and Earnest Moats was in direct charge of the construction and installation of machinery.

All of the officials and directing heads of the company are experienced men in the asphalt business. Mr. Wood, Mr. Le Suerer and Mr. Heil have been in the Kentucky asphalt district for the past six years, while Messrs. Williams and Moats have been actively engaged in asphalt production for more than three years.

The Kreiss Process for Making Non-Acid Fertilizer

AMONG the various experiments which are being made in the hope to cheapen the process of making fertilizer from phosphate rock, and thus lessen the "spread" between the rock producer and the farmer, the Kriess process is one that has received especial attention, since it has already reached some commercial success. It is thus described in a publication of the Geological Survey:

"In October, 1922, the Non-Acid Fertilizer and Chemical Co. of Lakeland, Fla., licensees of the A. L. Kreiss process, began operating a plant near Lakeland, which gives promise of commercial success. Local phosphate rock containing about 60 per cent tricalcium phosphate is mixed with an alkali flux (potassium carbonate, imported from Germany) and heated in a rotary kiln to a temperature of about 2000 deg. Fahr. A clinker resembling that of cement and said to contain 15 per cent of available phosphoric acid (including about 2 per cent of citrate-soluble phosphate) and 6 per cent of available potash is formed. This is ground and mixed in any desired proportion with other ingredients to make a complete fertilizer. The phosphate so treated contains no free acid and tends to reduce rather than to increase soil acidity. The plant at Lakeland is said to have a capacity of 80 to 100 tons a day and to have produced potassium phosphate at the rate of 40,000 tons annually. A random sample of the product collected by the writer in a recent visit to the plant was tested in the laboratory of the Geological Survey and found to substantiate in a general way the claims of the company regarding its phosphate and potash content. The sample was distinctly alkaline, although the degree of alkalinity was not determined.

"Excess alkalinity may be expected to neutralize the soil acids and thereby lessen the amount of citrate-soluble phosphate that may really be made available. Many plants are highly sensitive to the condition of the soil and fare badly or prosper according to whether their requirements of soil acidity or alkalinity are met. Thus, according to E. T. Wherry, of the United States Bureau of Chemistry, citrous fruits are tolerant of slight alkalinity in the soil, but their leaves are likely to turn yellow if too much alkali is present. The condition of the soil is determined not only by its constituents but also by the local conditions of soil drainage, whether downward and outward, or the reverse.

"It is clear that caution should be exercised in the use of an alkaline fertilizer and that local conditions will have much to do with the question whether it may be used to advantage. According to A. G. Meminger, treasurer and general manager of the company, steps have been taken in mixing the prepared fertilizers to reduce the alkali content. He reports good business and generally satisfactory results from the use of this fertilizer."

Interest in this process is very strong at the present time. This paper published the announcement of a new plant to be built in Tennessee, which will use the Kreiss process in its last issue.

Conditions in the phosphate industry are such that many engineers and chemists are doing research work in the hope of using lower grade rock or putting fertilizer into the farmers' hands at a lower price.

Phosphate Rock Production in 1922

THE U. S. Geological Survey has just issued figures on the production of phosphate rock for 1922, as a part of its forthcoming report, Mineral Resources of the United States. It is shown that there was an increase in quantity over the 1921 production of 17 per cent, but there was a fall in value of 15 per cent. The average price per ton for 1922 thus works out to $4.32 as against $5.43 for 1921. In the boom year of 1920 production was almost double that of 1922 and the value per ton was a little over $6, according to these figures.

Raw phosphate, to be applied directly to the land instead of being made into commercial fertilizer, shrank from a production of 79,189 tons in 1919 to 16,029 tons in 1922.

The only part of the country which shows an increase in the tonnage produced is the Rocky Mountain states in which the tonnage was raised from 4961 tons to 17,481 tons.

Florida, which produces 85 per cent of the total production of the United States, sold more phosphate rock by 16 per cent, but there was a decline of 20 per cent in the value. The hard rock, most of which is exported, decreased 28 per cent in value, although the quantity sold increased by 7 per cent. Conditions in the Florida field are said to be improving.

Tennessee rock increased 27 per cent in quantity and 16 per cent in value. This was mostly brown rock. Blue rock decreased 64 per cent in quantity and 65 per cent in value.

In the light of the above figures it is not surprising that a great effort is being made at the present time to find either some new method of marketing or preparation of phosphate rock to use as fertilizer whereby the product can be sold more cheaply to the farmer and the demand for phosphate rock can be increased. Efforts are also made to use the low grade material which at present has to be washed out or left in the ground, constituting a serious loss in production.

Scholarships in Mineral Economics

TWO scholarships in mineral economics are being offered by the Washington University of St. Louis through the Bureau of Mines, Department of the Interior, to mining engineering graduates who have completed some work in economics.

These scholarships, valued at $1500 yearly, will enable the holders to study for two years at the graduate school of Washington University in Washington, D. C., for a Ph. D. degree in economics.

The students will work under the technical guidance of Bureau of Mines engineers.

Hints and Helps for Superintendents

The combination of a wagon loader and portable belt conveyor used in a California plant for stock piling. In the picture the sand is being moved from one stock pile to another

Handling Material in and Out of Stock Piles

IN a recent issue of ROCK PRODUCTS, in this department, was shown a simple and effective method of stock piling and recoveringing crushed stone by means of a scraper bucket and hoist and a loading bin. This method is just as applicable to the storage of sand and gravel. In this number are found two methods taken from the sand and gravel industry which are equally applicable to the handling of crushed stone.

The lower picture shows an old method which has been revived in recent years, especially on the West Coast. As it came from the mining industry, in which it was one of the standard methods of handling waste rock, it would naturally be found out there.

This method might be called a gravity return system. It employs a trestle which is built at such an inclination that the car will run back by gravity. The car is pulled out to the end of the trestle by a small single drum hoist and dumps itself by striking a bar at the end of the trestle. Then it returns by gravity, the hoist being reversed so that the rope unreels from the drum.

On returning to the plant, the car is spotted below the spout of a bin and filled by opening the bin gate. This gate is usually opened and shut by ropes that run to the hoist so that one man can perform the whole series of operations, filling the car and closing the bin gate, running the car out to the end of the trestle and then returning the empty car for a new load.

The picture above shows sand being transferred from one stock pile to another by means of a wagon loader and a portable belt conveyor. The loader is a standard machine, driven in this case by a gasoline engine, although electric power might just as well be used. The portable belt conveyor was designed by the company and differs somewhat from the standard portable conveyors made by all makers of conveying machinery. But there is no reason why any of the standard makes of conveyors could not be arranged to work in the same manner.

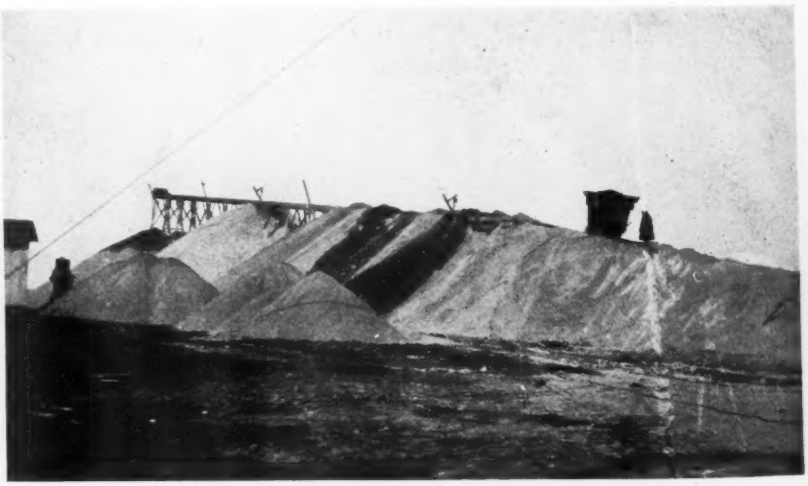
Such an arrangement has a capacity of 120 to 125 tons per hour, and in some cases even more. It can be handled by one man, for the loader is power-propelled, and the conveyor can be handled by hand.

The best types of these wagon loaders will dig crushed stone as well as sand and gravel provided that teeth are fastened to the digging edge of the bucket.

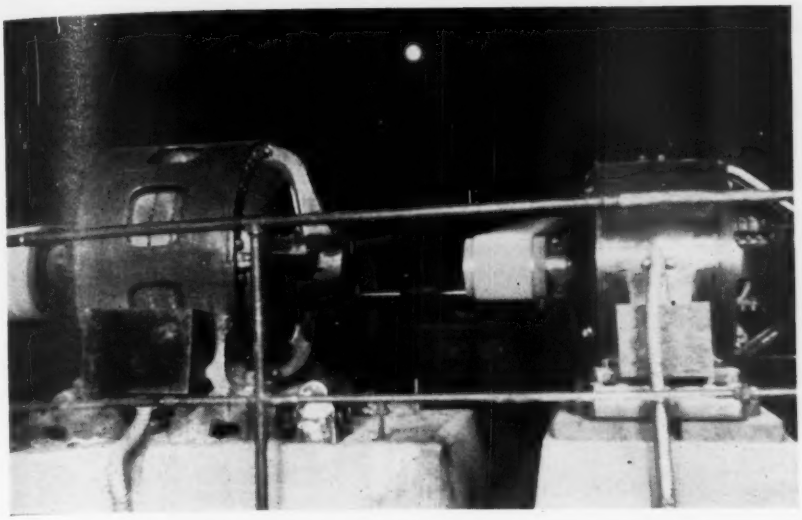
In handling damp sand with these loaders, the repairs are apt to run pretty high as the damp sand sticks to various parts of the machine, such as the chains, and cuts them rapidly. Damp sand is a great deal harder to dig than dry sand. It is for this reason that loaders of the type shown have in some cases been superseded by small crawler-type cranes for handling damp sand. The crane will work just as well with the portable belt conveyor by having a hopper on the lower end of the conveyor into which the bucket of the crane discharges.

For handling over longer distances than can be covered with a single conveyor, another conveyor or even two or three more may be joined, so as to place the sand at the desired point. This system is probably the lowest in point of first cost of any that could be designed to cover so large an area, and it is simple and does not require much labor. One man can handle it, but it usually pays to have some help from shovelers in cleaning up and in changing the loader and the conveyors.

This system may be employed to load directly into trucks. But a better method is to have the conveyor discharge into a small loading bin which will contain several truck loads, as the loading will proceed more rapidly and trucks will not be kept waiting so long. Where there is much truck business the bin is almost a necessity. Without a bin the trucks have to stand in line for loading and a lot of congestion occurs which makes the work of loading even slower. The bin should have at least a capacity of 40 or 50 yd. for this purpose.



A gravity return system of stock piling. The car is pulled up the trestle and dumped and then it returns to the loading point by gravity



Motor and generator connected through a steam engine

Connecting Motor and Generator Through a Steam Engine

THE picture, which was taken at the gypsum block factory of the Ebsary Gypsum Co. in Garbutt, N. Y., shows a motor running a generator through a steam engine shaft. Originally the engine drove the generator which furnished power and light for the plant. Then it was decided to purchase hydro-electric power. A motor was installed and belted to a pulley on the engine shaft which was disconnected from the crank. At any time that it is desired to return to steam power, as might happen from an accident to the transmission line, the belt can be thrown off and the crank connected and the engine is ready to go.

Simple Form of Traveling Hoist

THE photograph shows a set of blocks and falls which may take the place of the expensive traveling crane for light work. The upper block is suspended from a light-wheeled carrier. The wheels of the carrier run on a track on the upper side of the beams shown and these beams are supported by cast-iron hinges, also shown in the picture.

The next stage for heavier work might be one of the differential pulley sets. For still heavier work there is the motor-driven five-ton pulley set which begins to approach to the traveling crane.

Traveling hoist

Semaphore Signal for Dragline Operation

THE picture shows a rough home-made semaphore signal which is used in a dragline operation.

The dragline is stripping a slate quarry in Pennsylvania and the man in the hoist cannot see into the quarry. A man is placed in the quarry to direct the course of the bucket and he does this by means of semaphore signals.

The semaphore is only a pole with a fixed and movable cross arm. The latter is operated by cords which run to the ground and through small pulleys to wherever the man is standing.

In sand and gravel work the operator of the hoist can usually see his bucket and direct its operations without assistance. But there might be some cases in which it would be better to have an assistant direct the work, in which case such a semaphore could be installed.

Semaphore signals are more visible than hand signals and are less liable to be misunderstood.

Semaphore signal for dragline operation

More Swinging Launders

IN a recent issue were shown some applications of the swinging launder to building stock piles in sand plants. This picture shows the details of construction and suspension of a number of these which can be swung about a common center to cover a wide area.

Swinging launders

These steel launders are a standard manufactured product, being the same as those that are used for pouring concrete. They can be jointed to be set at an angle and traps in the bottom allow the sand to be discharged at different points. The weight is carried by a boom. The lower end of two of these booms is shown in the picture. Wire cables hold up the launders.

Co-operative Selling in the Slate Industry

Structural and Blackboard Slate Producers of Pennsylvania to Solve Their Operating and Marketing Problems

By A. B. Sanger

THE slate industry in the United States must solve a problem with which no other industry has to contend. Slate is a natural stone applicable for many uses and its market is unlimited, geographically. Yet almost the entire production is confined to four small localities: eastern Pennsylvania, Vermont, New York and Maine. Furthermore the milling of the slate must be carried on at the quarry, owing to the nature of the material.

The conditions in the slate industry up to the time of the war were going from bad to worse. Individual producers attempted to market slate all over the country in competition with fellow operators whose properties actually adjoined one another. As a result of non-co-operation and other difficulties, the industry as a whole was headed towards oblivion.

It was time for drastic treatment if the men who were brought up in the game were to save their inheritance. The logical thing to do was to get together and eliminate, not competition, but the evils which prevented fair competition. Several of the Pennsylvania slate men under the leadership of N. M. Male, Pen Argyle, Pa., and W. H. Smith, Bangor, Pa., formed in 1916 the Natural Slate Blackboard Co. and in 1918 the Structural Slate Co. Mr. William A. Kitto is general manager of both companies and it was through the courtesy of Mr. Male, the president, and Mr. Kitto that the writer was informed of and given permission to publish the facts concerning these companies.

It is a peculiar thing about slate that only a very small percentage of the material quarried can be made in the blackboards; this means that the individual operator cannot guarantee a supply of boards any length of time ahead. In the old days, if a producer received an order for blackboards which he could not fill he was loath to turn it over to his competitor, who might have had sufficient boards in stock. The result was that the natural slate blackboard industry gradually went down hill and was merrily helped on its way by manufacturers of composition boards. The rumor got around that the blackboard slate deposits were fast becoming exhausted.

What was needed was concerted action. Action not only in combining resources but in combating the inroads made in a legitimate industry by the manufacturers of goods inferior for the purpose for which they were intended. Many were the problems both internal and external. A natural antipathy to unite was the first problem to overcome; this was solved in a satisfactory manner after hard work. Possibly it was a case of "grasping at a straw to save oneself from drowning," but, happily, the "straw" proved to be a substantial life preserver.

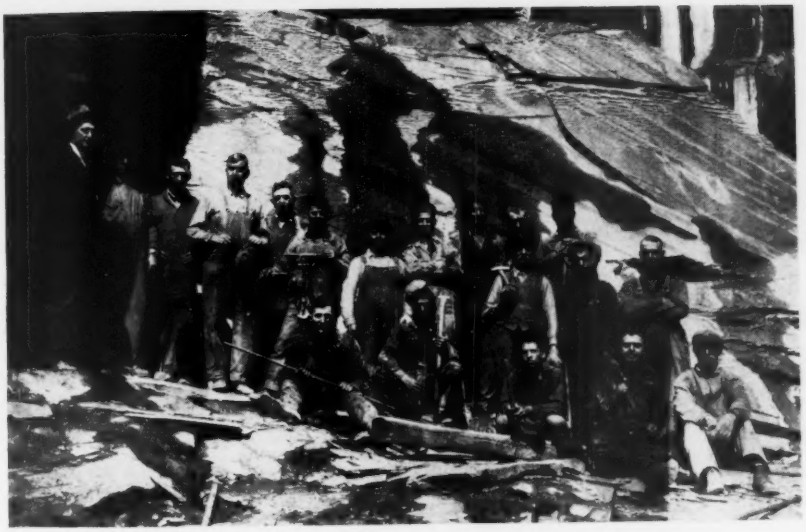
Work of hand methods of quarrying shown at left and of channeling machines at right

Panoramic view of Bangor, a center of the Pennsylvania slate industry

The company was capitalized at $250,000, all the stock being owned by the operators in the eastern Pennsylvania district. Not all producers joined, but those who controlled about 75 per cent of the production did. Each operator is entitled to one and only one directorship and vote is on that basis rather than on the number of shares of stock owned. In this way the smallest stockholder has just as much voice as the largest.

The purpose of the company is primarily selling as a co-operative unit, in this way helping to stabilize production. At the same time it is conducting a very strong

Storage yards, North Bangor



A group of slate quarrymen

Slate splitter on the job

campaign along publicity lines, although confining it almost entirely to direct mail to and personal solicitation among school boards, superintendents and school architects.

When the company was formed only about one-third of the schools in the United States had natural slate blackboards. The first point of attack was in New England, where it organized a subsidiary company among slate distributors (not producers) who immediately started a drive on the educational bodies in that section. Following this, Minneapolis and Kansas City came into line. Today, branch offices are located in ten cities of the largest centers of population and there are agencies in a half a dozen others beside.

A 60-Year-Old Blackboard

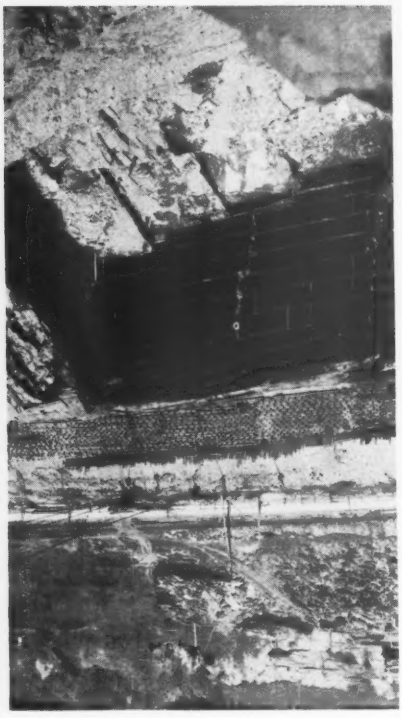
One of the most successful pieces of publicity work was brought out at Kansas City, where the company exhibited at the National Educational Association's convention. This group comprises a membership of 50,000 superintendents, principals and teachers. The prize exhibition was a section taken from the first natural slate blackboard ever placed in any school in the United States. This came from the Central high school of Philadelphia and was installed in 1863—incidentally this slate came from Pennsylvania. Every year the company has a booth at this convention and displays this section of blackboard which always arouses great interest.

The company is confining its efforts to domestic trade at present but in investigating foreign markets it took an unusual way of finding out what was wanted. Every American consul received a questionnaire with the request that it be filled out. It received very satisfactory co-operation, not only in replies to the questions about marketing blackboards in the various countries, but also in personal letters from the consuls which added materially to the information given in the questionnaire.

Not long ago the company received a request for samples and prices from a school board in Capetown, South Africa. These were submitted in competition with bids from manufacturers of substitute material. A reply was received to the effect that the authorities were convinced that natural slate was the only material to use but that the higher cost plus greater freight charges made it necessary to use a substitute. However, the company sent a complimentary slate board to the school authorities with the request that it be installed. The sequel is yet to be learned.

Factors of Competition

The company—in fact the entire industry—has two serious factors to contend with; namely, higher initial cost—approximately 25 per cent—and greater freight charges, due to the fact that slate is heavier than substitutes. Added to these is the advantage the substitute manufacturer has in being able to locate his factory where the three



Looking into the slate quarry at North Bangor

determining factors, source of raw materials, cost of production and market, dictate. The slate producer must mill his stock on the banks of his quarry.

Nevertheless, slate is a much superior material for blackboards and the company is taking every legitimate step to make its merits known. That the results are proving beneficial is an established fact. Today there is hardly a school north of the Mason and Dixon line and east of the Mississippi river but what has natural slate blackboards. The South and West are rapidly changing to this material, New Orleans and Los Angeles being notable examples. In 1922 more blackboard slate was sold than in any year prior to that time; 1923 will exceed last year. The company at present is marketing 95 per cent of the slate blackboards that is sold; normally about 80 per cent of the business passes through its hand. With the facilities it has for gathering production, it can carry a large stock on hand, and in this way enable the producer to operate continuously. However, today the company is many weeks behind in its orders so stocking is not a problem.

"Excavating the Earth to Educate Through the Eye"

One of its slogans is "Excavating the Earth to Educate Through the Eye." That and cold, hard facts are evidently proving to school boards and architects that quality and not price must be the determining factor when it comes to installing blackboards. Not only is the company putting the proper material into the schools but is, without question, putting the blackboard slate industry back on its feet again and will undoubtedly keep it there.

Gypsum Rates and Ratings

IN a mimeograph report on I. and S. No. 1868, gypsum, plaster, etc., Montana, to north Pacific coast destinations, the Commission held not justified reduced rates and/or minimum weights on gypsum, plaster, stucco and gypsum and plaster products, in straight or mixed carloads, or in mixed carloads with lime, from Montana points to destinations in Washington, Oregon, Idaho and Montana, with certain exceptions.

It said the proposed rates and minimum weights, which it condemned, were unduly prejudicial. Specifically, the Commission found that the suspended schedules had been justified in so far as they provided for reduced rates in connection with a minimum of 40,000 lb., and in so far as they provided rates to Colfax, Palouse and Pine Grove, Wash., and Moscow, Idaho, but that otherwise the proposed reduced rates and minimum weights, in so far as applicable to interstate traffic, would be unduly preferential of the mills at Hanover and Gypsum, Mont., and unduly prejudicial to the competing mills at Tacoba, Seattle, Gypsum and Mound House. It directed the cancellation of the suspended schedules without prejudice to the filing of tariffs in conformity with the findings of the commission.

Present rates on gypsum and the other products comprehended in the term "plaster" from Hanover, a point which the Commission deemed representative, to destinations west, the Commission said, were generally subject to minima of 40,000 and 80,000 lb. Subject to those minima, rates of 25 and 19½ cents, respectively, apply to Spokane, Plummer and certain intermediate territory, with rates of 27.5 and 25 cents, respectively, to main line points west thereof, including Blaine, Bellingham, Everett, Seattle and Tacoma, Wash., and Portland, Oregon, except that higher rates apply to stations on the Spokane, Portland & Seattle west of Kennewick, Wash., and east of Vancouver, Wash., and points west of Willbridge, Ore.

Respondents proposed to reduce generally the 80,000 minimum applicable to the rates to the destination territory described to 60,000 lb. In addition thereto they proposed reductions in the rates themselves. The schedules under suspension proposed a rate of 17.5 cents in lieu of the present rates of 19.5 cents to Spokane, Plummer and points east, and of 25 cents to stations on the Elk River branch of the Chicago, Milwaukee & St. Paul in Idaho. The same rate and minimum were also proposed for extensions to Cœur d'Alene and intermediate points east of Spokane, to which rates of 25 and 30.5 cents, subject to a minimum of 40,000 lb., were in effect. The respondents also proposed reductions of 4 cents in the rates, subject to the 80,000-lb. minimum, to stations on the Milwaukee and Great Northern east of the Cascades, and to Kennewick and points east on the Spokane, Portland and Seattle.

No reduction other than in the minimum, the Commission said, was contemplated as to the rates subject to the 80,000-lb. minimum to stations on the Great Northern and Milwaukee west of the Cascades and west of Kennewick on the S. P. & S., but the suspended schedules named new rates of 23 cents, minimum 80,000 lb., applicable to practically all points in western Washington on the Great Northern and Milwaukee, except points on the Milwaukee north of Bellingham, and to Portland, Vancouver and grouped points on the S. P. & S. With respect to stations on the Port Angeles and Rainier National Park branches of the Milwaukee, the proposed 23-cent rate would have superseded class rates applicable on that traffic.—*Traffic World.*

Utilization of Anhydrite

ANHYDRITE, which occurs in considerable quantities at some gypsum mines, is now practically a waste material. Steps have been taken by the Department of the Interior, through the Bureau of Mines, to determine the amount of anhydrite available at various plants, and the possibility of finding useful applications for it in industry, for example, as a substitute for gypsum as a retarder in portland cement. This work is being done at the non-metallic minerals station of the Bureau of Mines at New Brunswick, N. J.

Big Gypsum Bed in Canadian Wilds

IT is said that one of the world's most important gypsum beds has been discovered by an Ontario prospector. The deposit, said to be 99.8 per cent pure, stretches for a mile along a branch of the Moose river midway between Cochrane and James bay and extends inland for a distance of about 10 miles. However large that deposit may be, it is evidently too far from the consumers of plaster to affect the gypsum industry seriously.

New Ohio River Sand and Gravel Plant

A REPORT from Pomeroy, Ohio, says that West Virginia capitalists have secured river frontage for a sand and gravel plant which will be built at once. The sand and gravel will come from the Ohio river and the plant will cost $75,000.

The St. Louis Conventions

Interest Growing Daily in Crushed Stone and Sand and Gravel Meetings, January 21-23, 1924

JUST returning from a week's trip to New York and Washington, the editor is thoroughly enthused at the prospects of two record-breaking conventions in the rock products industry. Considerable friendly rivalry and competition is manifesting itself from the fact that the National Crushed Stone and the National Sand and Gravel associations happen to have chosen the same city at the same time for their 1924 conventions. They are both going to be good conventions, as the interest already shown insures.

Crushed Stone Exhibit

A meeting of the Manufacturers' Division of the National Crushed Stone Association held in New York City, November 19, was attended by 30 members and guests. Much interest was shown in the proposed exhibit of models and small equipment to be held in a hall adjacent to the convention hall at St. Louis on January 21, 22, and 23. About 50 prominent machinery, equipment, and material manufacturers have already joined this organization and with very few exceptions all will be represented at St. Louis prepared to do business with visiting quarrymen.

The program for the convention is being developed with an idea of having a maximum amount of time devoted to the discussion of live subjects raised by quarrymen. A score or more such subjects have already been suggested to the chairman of the program committee. Plans are making for a banquet with unusual entertainment features.

Sand and Gravel Men Secure Two Notable Speakers

Two issues for next year loom large in the opinion of T. R. Barrows, executive secretary of the National Sand and Gravel Association. They are the fate of federal aid legislation with the present Congress and the prospect of another coal miners' strike and all its attendant car-shortage troubles and embargoes.

With these in mind Mr. Barrows has scheduled W. J. McGarry, manager of the open-top car-service division of the American Railway Association, for an address, which will undoubtedly prove of vital interest to every producer. Mr. McGarry is in charge of the railways' clearing house for open-top car distribution problems.

On the matter of the prospect of more federal aid legislation, Mr. Barrows has an address scheduled by probably the best-posted man in the country, announcement to be made later.

Both conventions will have numerous moving pictures to show and a large amount of time will be devoted to problems of operation.

It is believed that if those attending the conventions will make necessary arrangements with their local railway ticket agents, enough convention certificates can be assembled at St. Louis (250) to obtain half rates on the return trip tickets. For details of how to arrange this apply to your local ticket agents.

R. C. Yeoman to Go to Construction Materials Company of Chicago

R. C. YEOMAN, engineer-secretary of the Indiana Sand and Gravel Association, has accepted a position with the Construction Materials Co. of Chicago

It was stated at the business meeting of the association that Mr. Yeoman was considering such an offer and the association promptly expressed its desire to have Mr. Yeoman continue his work in the most convincing manner possible, by offering him such a substantially increased salary that it represented the limit of what the association felt that it could pay.

ROCK PRODUCTS congratulates Mr. Yeoman on having obtained a better job and the Construction Materials Co. on having secured so thoroughly competent an engineer. But it feels it is speaking for the entire sand and gravel industry in regretting that Mr. Yeoman will not continue with the association's work.

R. C. Yeoman

His research studies which caused the adoption of the 15 per cent tolerance rule have not only added immense sums to the value of the sand and gravel deposits of Indiana but have added considerably to our knowledge of concrete design. His car sampling studies, which are not yet completed, have given us a new idea of the necessity of following certain fixed rules of sampling and of loading cars in such a manner that they can be accurately sampled. And his latest work, that of preparing a map showing the aggregate production of the state is of far more than local importance. All these matters have been of value not only to the Indiana sand and gravel industry but to the industry as a whole.

During Mr. Yeoman's term of service as engineer-secretary the work of the Indiana association may stand as a model for the proper activities of such an organization, and it is the hope of this paper that they will be carried on under whomsoever the association may choose as his successor.

Missouri Lime Plant Resumes Operations After Fire

THE new plant of the Crystal Carbonate Lime Co., Elsberry, Mo., has begun operations. The plant is built upon the site of the plant which was burned last April.

At present there are about 23 men employed at the plant, the payroll averaging approximately $500 a week.

The rebuilt mill is equipped with one 150-hp. oil engine, one crusher with a capacity of one car a day and two pulverizers, each with a capacity of a car a day. The latter machines are used in the manufacture of agstone.

Several men have been employed regularly in the quarry since the destruction of the mill, as the product used by steel mills does not require crushing, the stone for this purpose being first blasted out of the ledge and then broken up into the required size by sledge hammers. It is then loaded into trucks, hauled to the railroad dock and dumped into cars. The demand for fluxing rock is unusually heavy just now, orders having been placed for 18 cars a week.

Previous to the fire the Crystal Carbonate Lime Company was Lincoln county's chief industrial plant, employing at times nearly 50 men.

Maryland Lime Plant Damaged by Fire

THE general store and contents, office, postoffice and dwelling of the M. J. Grove Lime Co. of Hagerstown, Md., were recently destroyed by fire of unknown origin, causing a loss of about $25,000, partly insured.

Some months ago the plant was damaged about $50,000 by fire.

Cement Men from All Over the World in Convention

NEARLY 300 delegates representing the cement-manufacturing industry of the country, together with foreign delegates representing British, Scandinavian, South American and Japanese manufacturers, attended the 21st annual convention of the Portland Cement Association of America at the Hotel Biltmore.

Paul C. Van Zandt, former chief engineer of the Asano Cement Co., Tokio, Japan, gave an illustrated lecture on the cement industry of that country and on the effects of the earthquake on some of the plants of this company. The largest and newest plant of the company, described in detail in ROCK PRODUCTS, April 22, 1922, was seriously damaged, but has since been repaired and put into operation. Soichiro Asano, president of the company, who was reported killed in the early reports of the earthquake, was uninjured, and the loss of life at the plants was not considerable.

The extensive campaign conducted during the year, in which more than 5,000,000 daily newspapers were used, will be continued. The purpose of this campaign is to improve and extend the uses of concrete. The annual election of officers resulted in the re-election of President F. W. Kelley, Albany, N. Y.; First Vice-President Blaine S. Smith, Chicago; Second Vice-President L. R. Burch, New York, and John W. Boardman, of Detroit, was elected treasurer. Mr. Boardman is the only new officer.

Principal topics which came before the convention were cement road building, small concrete house construction, stimulation of the all-year-round building program in this country to stabilize and lower prices of materials and wages of those employed in the various building trades, and meeting the increased demand for portland cement throughout the world. The convention terminated with a formal dinner at the Hotel Biltmore.

Cement Is Cheaper in the United States Than in Europe

H. STRUCKMANN, president of the International Cement Co., has recently returned from Europe. He gave interviews to New York papers in which he summarized the cement situation abroad and made the somewhat startling statement that cement is selling here at a lower figure than domestic prices in Europe.

In speaking of the tremendous growth of the cement industry here, he went on to say that, "although portland cement today is conceded to be the most important of all building materials, it is being sold at less than half a cent per pound at the mill. Taking into consideration the fact that half a ton of coal is consumed in the production of one ton of cement, and also that producers in the United States are paying in wages almost double the sum paid by European manufacturers, this country may justly be proud of its cement industry.

"Bituminous coal delivered at the plants costs more per ton than the manufactured product. One bushel of wheat, a ton of coal, or a day's wages today at the plant will purchase more cement, by from 30 to 250 per cent, than it would in 1892," said Mr. Struckmann.

Cement Bids for Indiana Highways

THE Indiana State Highway Department appears to have obtained real competition in cement prices in bids received from seven companies, members of the department say. They were pleased with the results of the bidding.

The department received bids for approximately 1,500,000 bbl. of cement, estimated to cost more than $3,500,000, in its 1924 program for the construction of approximately 400 miles of hard surface roads. The bids range from approximately $1.65 to $1.82 a barrel at the mills, in comparison with $1.60 to $1.75 paid for cement used this year.

In the present bidding, cement is to be delivered at approximately 50 places in the state. The Louisville Cement Co. bid for delivery to Indianapolis, $2.13 a barrel, net. The net price includes the mill price plus the freight, with a deduction of 40 cents a barrel for the return of cloth sacks and 10 cents a barrel for cash. The Universal Portland Cement Co., the Lehigh Cement Co. and the Indiana Cement Co. bid $2.11 a barrel, and the Atlas Cement Co. bid $2.30 a barrel, all net prices. The Sandusky Cement Co. bid $1.80 a barrel, mill base. For delivery at Dyer, Lake county, the Universal, whose plant is in that county, bid $1.84 to $1.94 a barrel net, the Lehigh company bid $2.21 and the Atlas company $2.34. For delivery at Jeffersonville, the Universal company bid $2.18 and the Atlas company $2.42, both prices net.

The lowest bidder was the Universal company, a subsidiary of the United States Steel Corp., with an estimated bid of $1.65 at the mill, and the highest was the Wabash Cement Co. of Stroh.

The commission did not advertise this year, as it had in the past, but received proposals in answer to requests.

Death of Well Known Cement Manufacturer

GEORGE W. HACKETT, president of the Castalia Portland Cement Co., which concern he organized, died recently at his home, 416 Morewood avenue, Pittsburgh, Pa., aged 69 years.

His death was caused by heart trouble and hardening of the arteries. He was one of the best known cement manufacturers in the United States, with which industry he had been associated for 45 years.

Mr. Hackett was born in Pittsburgh, October 5, 1854, and had lived in this city all his life. He entered the builders' supply business early in life and organized the firm of Prentice & Hackett. In 1896 he organized the Castalia Portland Cement Co., with plants at Castalia and offices in Pittsburgh. He also was a director of the Crescent Cement Co., which has a plant at Wampum, Pa.

The deceased leaves his widow, Mrs. Nellie Dunbar Hackett, one daughter, Miss Grace M. Hackett, who lives at home, and one son, George D. Hackett, also of Pittsburgh.

Mr. Hackett was a member of the Shadyside United Presbyterian Church, of which he was an elder.

There are few, if any, men now living in the United States who can look back over the years and say that they have seen the cement industry almost from its beginning in this country, as Mr. Hackett could have said.

Outlook For Cement In 1924

THE demand for cement has slackened during the last three weeks, probably due to the temporary cessation of road work. However, there is an enormous amount of work on highways, railroads and industrial developments projected to go ahead, but much of it will probably be deferred until spring. There is already enough of this projected work in sight to indicate that 1924 will be another record-breaking year for the cement shippers. This year will be far ahead of any previous year, in both production and shipments of cement. Last year shipments were 116,000,000 bbl., as compared with about 100,000,000 during 1921. This year they are expected to run close to 135,000,000, or about 14 per cent greater than the best previous record. Cement prices dropped early this month. The reduction averaged 15 cents a barrel, making the present base price at the mills $1.85 a barrel. This brings cement down to within 25 cents a barrel of the lowest price which has prevailed during the last five years. The lowest mark since the Armistice was $1.60, which went into effect in November, 1921.—*Monthly Trade Review*, November 21, 1923, issued by Tomkins Brothers, Newark, N. J.

British to Consume More Cement at Home

WHEN the British government starts on its road-building plan, which provides for an expenditure of $11,000,000, in order to relieve unemployment in England, American ideas in concrete road construction will be largely adopted, P. M. Stewart, head of a British delegation of 13, representing 90 per cent of the cement manufacturers in England, announced recently at the Portland Cement Association's convention at the Hotel Biltmore, in New York City. The British delegation has just returned from a tour of neighboring states.

Mr. Stewart declared this country was far ahead of Great Britain in road building, but behind his country in house construction. He said this was due to the fact that the British government had never allowed the building of houses on American lines, owing to the fire risks involved.

New Cement Plant for Detroit

A CEMENT plant, the first in Detroit, will be erected this winter, by the Peerless Portland Cement Co., of Union City. When completed the plant will be able to turn out 1,500,000 bbl. a year and will have cost $3,500,000, according to a current newspaper report.

After a year's search, the company located 14 acres of land adjoining West Jefferson avenue, which is accessible by rail, water and highway systems of transportation, and which is regarded as one of the few sites ideally located in Detroit for a cement factory. This site faces on Jefferson avenue and rests on the bank of the Rouge river, and is served by the Michigan Central railroad. The fact that raw products may be brought to the plant either by rail or water, and the finished products may be delivered by rail, water or highway, makes the site desirable.

The most modern equipment will be installed. In spite of its size only 200 men will be needed to operate the plant, because of modern, labor-saving machinery used. In a warehouse which will hold 200,000 bbl. of cement, it will be possible to load five railroad cars and 20 trucks at one time, while boats can be loaded simultaneously from docks at the door.

Storage facilities for 150,000 tons of stone, 40,000 tons of clay, 3000 tons of gypsum and 25,000 tons of coal are provided in the plans drawn for the establishment. Boats carrying stone will be unloaded at the rate of 2500 tons an hour.

The heat which is given off by the kilns will be used to make the power for the whole plant. Likewise the dust, which escapes from the kilns, will be precipitated and saved. It is estimated that 70 bbl. of cement dust will be saved each day by the plant.

The Rouge will be deepened and the shore line straightened at the new site, to allow 600-ft. boats with 21-ft. draft, to tie up at the docks of the company. Erection of the docks will be started immediately after the government completes changes in the shore line. It is expected the foundations for the plant will be finished by May 1, and that the plant will be producing cement by August 1, 1924.

Detroit and its vicinity uses 3,000,000 bbl. of cement annually, officers of the company say. The cost of transporting a barrel here from Union City, the nearest cement plant, is now about 40 cents. The company will retain its holdings in Union City, where repairs and renovations will be made to the plant there. It has a capacity now of 600,000 bbl. annually.

Cement Cut 18 Cents in Kansas City

THE price of cement was reduced 18 cents on the barrel in Kansas City on November 13. Cement, which formerly cost $2.85 a barrel, now sells at $2.67, purchased in carload lots.

Howard McCutcheon, president of the C. A. Brockett Cement Co., in discussing the reduction, said this was next to the largest cut since the high peak, September 18, 1920, when cement sold at $3.65 a barrel. The last reduction, one of 7 cents, was made in March, this year, Mr. McCutcheon said, according to a newspaper report.

Indianapolis Cement Cut Ten Cents

THE Universal Portland Cement Co. has given notice of a reduction of 10 cents per barrel in Indianapolis. Other companies have met the reduction in price.

The new price replaces a mill base price of $1.85 a barrel, plus freight to destination and a charge for sacks. The reduction of 10 cents a barrel amounts to 2.5 cents a sack. The Indianapolis price, including mill base price, plus freight and sacks, has been $2.71 a barrel, cloth sacks, the reduction makes the price $2.61.

One year ago the mill base price was $1.80 a barrel, 5 cents a barrel lower than the price just superceded.

The announcement is of particular interest to the Indiana State Highway Department, and may mean that the cement for the department's big 1924 program may be bought at possibly as much as $400,000 less than the cost on the $1.85 basis.

Marquette Cement Company May Yet Use Its Warehouse

HOPES of eventually being able to use the immense and costly warehouse which it erected several months ago at Schmidt road and the Rock Island Lines right-of-way, in Davenport, Iowa, were revived in the Marquette Cement Co., of La Salle, Ill., when the Interstate Commission set the date for a rehearing on its application to store and sack cement in transit.

The Marquette company built the great warehouse here last spring at a cost of over $125,000 but owing to a ruling of the Interstate Commerce Commission, following the protest of other cement manufacturing concerns, was prevented from securing the freight rate that would have allowed storing and sacking.

After several months the Marquette company has been allowed another hearing on this question. The hearing will take place December 5, in Chicago, according to notice received by Traffic Commissioner George M. Cummins, of the Chamber of Commerce. Examiner Donnally will hear the evidence.

To Investigate Dumping of Foreign Cement

FOREIGN representatives of the Customs Special Agency Section of the Treasury Department have been instructed to investigate and report as soon as practicable the foreign market values back to April 1 of British, Norwegian, Swedish, Danish and German cement and to forward any other information available bearing on the question of "dumping."

This inquiry results from complaints by the Sun Portland Cement Co. and the Oregon Portland Cement Co. to the collector of customs at Portland, Ore., that cement was being imported from Norway and Sweden at prices below the home market price, thus coming into conflict with the anti-dumping act of 1921. Dumping is proven by the fact that cement here sells for less than in Europe.

Japanese Cement Production

THE annual capacity of Japan's cement mills was, before the earthquake, in the neighborhood of 14,000,000 bbl. and plans are under way which will, within six months' time, bring this up to 17,000,000 bbl., notwithstanding the losses suffered by the earthquake. Until such time as this increased output is brought about it is expected that the domestic supply will be inadequate and that considerable cement will have to be imported. In anticipation of this need, the government has placed cement on the free list effective until March 31, 1924.

Giant Cement Dividend

THE Giant Portland Cement Company has declared a dividend of 3½ per cent on account of arrearages on the preferred stock, payable December 15 to stock of record November 30. This leaves about 35 per cent of unpaid dividends on the issue.

Protest Against Iowa Tax on River Sand and Gravel

NEWS dispatches from Iowa say that there is considerable protest against the proposal to tax sand and gravel taken from rivers on the ground that the dredging confers a public benefit.

The proposed tax on sand and gravel taken from meandered streams probably will be fought out at the special session of the legislature this winter. The State Board of Conservation has urged a levy of 3 cents a ton, but the state executive council has withheld approval of this step pending investigation of protests lodged by sand and gravel dealers of Iowa.

The legislature never intended that the board should have the power to take action of this sort, objectors say, as a bill designed to make just such a levy went down to defeat in the closing days of the recent session. The phrasing of the law recognizing the board, however, gave it the authority to act.

Dredging Prevents Floods

The chief objection to such a tax is that the sand and gravel dealers are really rendering a service by keeping the streams dredged. The dealers presented this argument at the recent hearing before the executive council. They claim that if it were not for the removal of sand and gravel from the river many tracts of land would have been flooded several times within the last few years.

Another objection is that the tax would be an unfair burden on dealers who get their sand and gravel from the rivers. With access to the river only four months out of every year, they have to compete with concerns which have the use of pits for the full 12 months.

Board Wants to Collect Three Cents a Ton

In its resolution passed October 12, the board declared it was not now able to determine the exact value of the sand and gravel to the state, but that it desired to prohibit its removal from state property without proper agreement with the board. The resolution then declared that "if any of the persons, firms or corporations desire to lease a right for a period of six months from and after the first day of October, 1923, then in that event, the secretary of the board is authorized to prepare and execute in the name of the board proper leases for consideration of which is to be the payment due the board of conservation, state of Iowa, of a specified sum of 3 cents a ton for each ton of sand and gravel taken from such state property."

The matter is of more than local interest. In several states sand and gravel producers pay a similar tax to that proposed in Iowa, and if the contention of the Iowa producers in true these producers have been paying for the privilege of performing a public service.

River Improvement to Secure Gravel Supply Near San Francisco

A NEWS dispatch from Guerneville, Calif., tells of contemplated improvements to the Russian river which will especially aid the sand and gravel industry. It says that engineers of several gravel companies of San Francisco, through permits from the U. S. Government, are making surveys at the mouth of the Russian river, with the idea of a wall or jetty to enable small tonnage boats to enter. The gravel supply around the bay cities is beginning to trouble the big gravel companies by its scarcity, and the mouth of the river will furnish unlimited quantities of clean gravel for years to come, and by making the river as far as Duncans Mills, navigable, the transportation problem will be solved for the gravel companies, either by rail or water.

Heavy Winter Construction Planned in New York

NEW YORK papers say that the downward trend of building materials since August, combined with "fluid" building money and the prediction that wages are liable to stay where they are if they do not rise, have combined to give a strong upward turn to the curve of building projects.

The list of projected buildings which are to be erected this winter is almost as great as it was in 1923, numerically, and in value it is one-eighth more.

Regarding this movement the New York *Times* says in part:

"There were 92 barges, averaging a capacity of 500,000 brick each, unloading in this city Saturday morning, not for dealers' stocks, but for actual jobs. The dealers have no stocks. The market is taking brick too fast to stack, although this is the time for them to lay in winter reserves. Seventeen more barges will be here Monday morning.

"Cement manufacturers broke all monthly records for manufacture in this country in October with 13,350,000 bbl. The national stock is only 450,000 bbl. more than a year ago. Almost every other department of building material and equipment has its own evidence of the unseasonable character of the building industry.

"The only limitation to winter construction will be the availability of materials. The spring limitation will be the availability of labor. By summer it may be a question of limitation of building money. The experienced building investor is evidently picking the lesser risk."

Kansas Sand Producers and Rail Officials Confer on Rates

ARKANSAS valley and Kaw valley sand producers and representatives of Kansas railroads have recently been in conference with the Public Utilities Commission with regard to freight rates on sand. The sand freight rates have been under fire for more than a year and the producers and the rail officials are nearing an agreement. A mileage freight rate scale will be used throughout the state with the exception of the southeastern portion. Grouping of producers by sections also will be continued.

1923 Adds Big Mileage to Fedreal-Aid Roadways

FEDERAL-AID roads totalling 8820 miles were completed during the fiscal year ending June 30, 1923, bringing the total of Federal-aid roads completed to 26,536 miles. The mileage completed during the year is classified as follows:

	Miles
Graded and drained	1860.1
Sand-clay	749.5
Gravel	3815.4
Waterbound macadam	335.6
Bituminous macadam	452.9
Bituminous concrete	76.8
Concrete	1440.3
Brick	78.8
Bridges	10.8
Total	8820.2

The projects under construction at the close of the year amounted to 14,772 miles and were estimated as 55 per cent complete. In addition to the 26,536 miles completed and the 14,772 miles under construction there were at the close of the year a number of projects approved but not yet placed under construction, the aggregate length of which was 6917 miles.

Another Kentucky Cement Plant Probable

THAT there is still a probability that a $1,500,000 cement plant will be established near Middleboro, Ky., was indicated in a statement made by J. H. Bartlett, executive of the American association. He stated that the company which holds an option on the property here is now constructing a cement plant on Signal mountain, Chattanooga, and that they would carefully investigate the property here, along with market conditions and transportation problems. These factors, he stated, enter largely into the successful operation of such a plant. —*Knoxville, Tenn., Sentinel.*

Increase in Sand and Gravel Rates in Southeast

On Long Distance Two-Line Hauls

PROPOSED RATES on sand and gravel from stations on the Charleston & Western Carolina to the southeast have been found justified by the Commission in a report on I. & S. No. 1848, Sand and Gravel from Stations on the Charleston and Western Carolina Railway to the Southeast, opinion No. 8869, 83 I. C. C., 436-42, and the order of suspension has been set aside as of November 27.

By schedules filed to become effective July 1 and 5, 1923, respondents proposed to increase the rates on clay, cement, or paving gravel, referred to as paving gravel, and common sand, from points on the Charleston & Western Carolina to points in the southeast. Upon protest of shippers, various officers of the State of Georgia Bureau of Public Roads, U. S. Department of Agriculture, and others, the operations of the schedules was suspended until November 28. Pending its decision in the case, the Commission said it had authorized respondents to increase the present rates on paving gravel and common sand 15 cents per ton of 2000 lb. subject to the proposed rates as maxima, but said no such schedules had been filed. Continuing the Commission said:

> Respondents' principal reason for proposing the suspended rates is that they consider the present rates unduly low. They were originally established to encourage the building of public roads. With respect to distance, some of them are improperly related one to another, although they are grouped at origin. For example, the rates to Waycross, Ga., and Jacksonville, Fla., are $1.02, while the distances from Steel Creek, the most important shipping point, via Yemassee and the Coast Line, are 212 and 268 miles, respectively. To Valdosta the rate is $1.35, but the distance from Steel Creek via Yemassee and the Coast Line is only four miles greater than that to Jacksonville, or 272 miles. The following table, showing the present rates on paving gravel, distances, revenues per ton-mile and per car, and the amount of the proposed increases from South Carolina pits to representative destinations, is from exhibits. The distances are those from Steel Creek. The revenues per car are based upon an average load of 66,000 lb.

The protestants contended that the proposed increases would seriously diminish the movement of paving gravel from C. & W. C. pits and curtail the building of public roads in the so-called coastal plain, or southeastern Georgia, a thinly settled section producing no road-building materials.

The Commission said the proposed rates for both single-line and joint-line hauls were lower for comparable distances than many specific commodity rates on sand from or between points in official territory, and that they were also lower on the whole than those under the single-line and joint-line mileage scales prescribed in Memphis-Southwestern Investigation, 77 I. C. C., 473-593, on sand, gravel, clay and similar commodities in southwestern territory as therein described. For distances up to 60 miles the proposed scales are generally higher than those prescribed for the southwest, but for distances greater than 60 miles the proposed single-line scale is generally lower than the corresponding southwestern scale, the Commission said, adding that the difference was substantial for the longer distances and that most of the traffic from C. & W. C. pits moved distances greater than 100 miles.

The protestants also contended that the differences between the proposed single-line and joint-line rates were excessive. The Commission said these differences varied from 9 to 27 cents, and that, under the scales prescribed in the Memphis-Southwestern Investigation, the spreads between the single-line and joint-line rates ranged from 10 to 30 cents.—*Traffic World.*

SOUTHEASTERN RATES ON SAND AND GRAVEL

To	Distance miles	Present rate	Revenue per ton-miles mills	Revenue per car	Proposed increase per ton cents
Savannah, Ga., via Yemassee & Atlantic Coast Line....	*115	$0.90	7.8	$29.70	27
Waycross, Ga., via Yemassee & Atlantic Coast Line....	212	1.02	4.8	33.66	47
Brunswick, Ga., via Yemassee & Atlantic Coast Line....	†236	1.02	4.3	33.66	51
Valdosta, Ga., via Yemassee & Atlantic Coast Line.....	‡272	1.35	4.9	44.55	27
Jacksonville, Fla., via Yemassee & Atlantic Coast Line	§268	1.02	3.8	33.66	60
Atlanta, Ga., via Augusta & Georgia R. R.....	205	1.13	5.5	37.29	54
Macon, Ga., via Augusta & Georgia R. R.....	159	1.13	7.1	37.29	45
Moultrie, Ga., via Augusta & Georgia & Florida Ry...	263	1.69	6.4	55.77	7

*Via Coosaw, S. C., and the Seaboard Air Line the distance is 95 miles.
†Via Allendale, S. C., and Southern, 194 miles.
‡Via Augusta & Georgia & Florida, 253 miles.
§Via Allendale & Southern Railway, 250 miles.

The C. & W. C., the report said, insisted it could not divide the earnings under the present rates with its connections and handle the traffic at a profit. The protestants suggested that the carrier could increase its revenues per car by furnishing large equipment, as it was possible to load more than 66,000 lb. of gravel in cars of capacity greater than 60,000 lb., or the type usually furnished them for loading. The Commission said if the proposed rates were permitted to become effective they would apply on gravel of all kinds and common sand between Augusta, Ga., and points on the C. & W. C. in South Carolina and from pits in South Carolina to points in Georgia and Florida.

An Injunction Suit That Involves Washing Gravel

[The following from the Waterloo, Ind., *Press* is of interest to ROCK PRODUCTS readers because the process of washing sand and gravel is involved. One of the objections to the Independent company removing more gravel is the fact that a considerable portion is wasted. The adoption of rigid specifications for sand and gravel by highway commissions and others has made sand and gravel a *manufactured* product, and there is necessarily some waste of raw material in the making. The specifications, and not the washing process, are responsible for the waste. The status of washed sand and gravel as a manufactured product has been fixed for some time.—Editor.]

AN injunction to restrain Clarence Botschuck, Amos Botschuck and Charles Haynes, partners in the Independent Construction Co., from taking gravel from the pits owned by Forest A. Hixon, Sarah E. Hixon and Mabel M. Hixon, in Butler township, is sought in a suit filed in the DeKalb circuit court.

There are valuable deposits of gravel on the Hixon farm, suitable for road work and in building construction. On May 29, 1923, the owners of the farm entered into a contract with the Hoffman Co., road contractors, by which the Hoffman Co. was given the right to take out the gravel needed during the year 1923. This contract, according to the complaint was subject and subordinate to the rights given the righway commission of Indiana, and the Hoffman Co. was to take gravel from some other part of the farm than that in use by the highway commission.

The Hoffman Co. employed the Independent Co. to remove the gravel and the complaint says there already has been removed all the gravel needed by the Hoffman Co. during the year 1923, but that nevertheless the Independent Co. continues to remove gravel from the farm.

The contract provided, says the complaint, that the gravel was to be removed in manner to prevent waste. The Independent Co. constructed a gravel washing plant on the farm and the plaintiffs say that more than half of the gravel is discharged from this plant and is run into a stream or into excavations made by the company. Here it is mixed with dirt and with other refuse and thus is made inaccessible and of no value. The machinery is located and the discharge of the gravel is done near the plant of the highway commission, the Independent company thus encroaching on the rights granted to the commission and preventing the proper use of the land by the commission. The washings are discharged upon the gravel deposits that the commission desires and intends to use, making it impossible for the commission to obtain the gravel it wants, states the complaint.

Lower Freight Rates on Stone and Gravel Are Possible

Chamber of Commerce Committee, Composed Largely of Railway Officers, Sees Need of Readjustments

THE POSSIBILITY of a reduction in rates on important basic commodities, through a readjustment of freight rate schedules, is held out by the Committe on the Readjustment of Relative Freight Rate Schedules, designated by the Chamber of Commerce of the United States, in a report submitted November 26.

The committee finds that a readjustment of class rates should result in a measurable increase in total revenue of railroads, which may be augmented by advances in certain commodity rates now manifestly too low in relation to other rates. "Such proceeds," it suggests, "should be applied to the reduction of commodity rates where needful. Any measure of relief afforded by these reductions, even if small in magnitude, will be a step in the right direction."

The committee is one of five designated by the president of the National Chamber to consider different aspects of the transportation problem in advance of a general transportation conference to be called later. It includes in its membership traffic officials of a number of railroads, representatives of agricultural and labor organizations, traffic managers of large commercial and manufacturing concerns and spokesmen for the investing public.

The chairman of the committee is F. A. Delano, former member of the Federal Reserve Board. The members are:

H. M. Adams, vice-president, Union Pacific System, Omaha;

Hon. Sydney Anderson, member of Congress, Washington, D. C.;

Dr. Frank App, New Jersey Federation of County Boards of Agriculture, Trenton;

Joseph M. Belleville, general traffic manager, Pittsburgh Plate Glass Co., Pittsburgh;

B. Campbell, vice-president, New York, New Haven and Hartford Railroad Co., New Haven;

Edward Chambers, vice-president, Atchison, Topeka & Santa Fe Railway System, Chicago;

Archibald Fries, vice-president, Baltimore & Ohio Railroad Co., Baltimore;

E. J. Frost, vice-president, William Filene's Sons Co., Boston;

P. L. Gerhardt, vice-president, Bush Terminal Co., New York;

Dwight B. Heard, president, Dwight B. Heard Investment Co., Phoenix, Ariz.;

Frank F. Henry, Washburn-Crosby Co., Buffalo;

G. H. Ingalls, vice-president, New York Central Lines, New York;

Chas. S. Keene, vice-president, American Tobacco Co., New York;

Alexander Legge, president, International Harvester Co., Chicago;

A. J. Lovell, vice-president, Brotherhood of Locomotive Firemen and Enginemen, Washington, D. C.;

W. C. Maxwell, vice-president, Wabash Railway Co., St. Louis;

E. M. Poston, president, New York Coal Co., Columbus, Ohio;

C. E. Spens, vice-president, Chicago, Burlington & Quincy Railroad Co., Chicago;

A. R. Smith, vice-president, Louisville & Nashville Railroad Co., Louisville;

P. C. Sprague, traffic manager, M. A. Hanna Co., Cleveland;

Theodore F. Whitmarsh, president, Francis H. Leggett Co., New York;

J. G. Woodworth, vice-president, Northern Pacific Railway Co., St. Paul.

Work With, Not Against the Railways

FOLLOWING close upon the heels of the decision of the Interstate Commerce Commission not to attempt a revision of freight rates on basic commodities, upon the petition of the American Mining Congress, is the report published herewith.

The committee which makes this report is composed largely of railway traffic officers. It can not but be interpreted as a bid for cooperation on the part of shippers to bring about by natural and businesslike means a revision of rates where such revision will be to the mutual advantage of both railway and shipper.

The report gives distinct recognition to the argument so long advanced by sand, gravel and crushed stone producers, that these basic, low-priced, heavy-load commodities in many cases bear an undue share of the freight rate burden.

No energy expended in a righteous cause is ever wasted, so that every effort of the sand gravel and crushed stone industries in the last four or five years to get a hearing both in public and in private is here bearing fruit. They have succeeded in convincing the railway operators themselves that theirs are real industries and entitled to consideration. Let everyone in the rock products industry work hard both individually and collectively to maintain this position.—Editor.

The reduction of rates on important basic commodities is regarded by the committee as only one phase of the larger problem of the readjustment of relative freight rate schedules. "The rate problem of the hour," it says in its report, "is one of better adjustment of relative rates, not of a general reduction of all rates."

"There is no need nor justification," the report continues, "for a general reduction of freight rates at the present time, whether viewed from the standpoint of relative levels of freight rates and commodity prices now and before the war, of rates in this country as compared with foreign rates, or of the net return which the railroads have been earning on the value of their property devoted to the public service.

"That freight rates as a whole are not an undue burden or stifling influence on commerce is evidenced by the heavy carloadings on our railways this year. For several months each week has produced loadings in excess of those reported for any corresponding period in past years, and the record for all time has been broken time and again."

"Readjustment Desirable"

This, however, is not taken to preclude rate changes. The committee, on the contrary, holds that certain readjustments are necessary.

"The desirability of adjusting freight rate schedules so that different classes of business shall stand on their own feet is sufficiently evident; the difficulty of doing so is not, perhaps, so obvious. As already indicated, our rates are the result of an evolution influenced by many factors, some economic, some geographic and other political. So many carriers and so many commissions, so many practices and so many forces other

than those based on sound principles have affected them, that today they are almost inextricably involved.

"Yet in spite of attendant difficulties, it is evident for the reasons stated and for others that will be presented that the time has arrived for greater simplification in our rate system, both as they have developed and as they have been applied. The studies that have been made by and for this Committee show that adjustments in relative freight rate schedules, particularly those applying to less-than-carload shipments and to class traffic generally, are not only possible but eminently desirable."

Without attempting to pass upon the local, sectional or class issues that come properly within the jurisdiction of the Interstate Commerce Commission, the committee lays down the principles which, it believes, should govern the readjustment of freight rates in the following conclusions:

Principles of Rate Making

"1. Viewed as a whole, railroad rates in the United States are not unreasonably high, either as compared with pre-war rates in relation to general price levels or as compared with foreign rates. They have afforded the railroads an average rate of return considerably below that which the Interstate Commerce Commission, acting in accordance with the law, has determined as fair. They do not as a whole hinder the processes of production or distribution. The present problem is one of a better adjustment of relative rates—not a general reduction of all rates.

"2. It cannot be claimed that the railroad freight rate structure of the United States has ever been organized on a scientific basis, or that it has ever been systematically revised with the purpose of eliminating disparities. The great economic changes incident to and resulting from the war have created additional disparities resulting from horizontal rate changes, from the dislocation of relative price levels and from increases in labor costs and terminal expenses which have borne with greater weight on some classes of traffic than on others. The situation renders a readjustment of relative freight rates of great immediate importance.

"3. A survey of class rates shows a great lack of uniformity, either as between classes, between products, or between regions, except in certain limited areas. Unreasonable disparities exist between the rates in different states. Revisions of class rates in three important sections of the country are now in progress and early completion of these revision is extremely desirable.

"4. In the readjustment of freight rates, consideration should be given to basic principles of rate making and to particular conditions affecting each type of business, notably less-than-carload and light-and-bulky traffic as contrasted with heavy loading articles. Careful consideration shows that the revenue derived from the former types of business is unduly low as compared with that obtained from the latter type. This statement applies to goods moving under both class and commodity rates.

"5. A readjustment of class rates (including less-than-carload rates) should result in a measurable increase in total revenue, limited chiefly by reason of the relatively small volume of business concerned. This increase in revenue will, however, be augmented by advances in certain commodity rates, which are often founded on class rates and will be realigned in accordance with class rate revision. Such proceeds should be applied to the reduction of commodity rates where needful. Any measure of relief afforded by these reductions, even if small in magnitude, will be a step in the right direction. Care should be exercised, however, that such reductions be not made a hardship to any particular railway system."

Pennsylvania Manufacturers and State College Indorse High Grade Fertilizers

FULL co-operation in support of the Pennsylvania list of high-analysis fertilizers was promised at a conference held November 8 in Pennsylvania between officials of the state college and the agricultural experiment station and representatives of the manufacturers selling fertilizer in this state. The meeting was part of the campaign which has spread to all parts of the country to bring about greater manufacturing efficiency and economy of distribution, through the general use of somewhat more concentrated fertilizers. To this end the experiment stations in most of the states have selected limited lists of fertilizers, none of which contain less than 14 per cent of actual plant food, and it is hoped that farmers will rapidly realize the advantages of confining their purchases to those lists.

In introducing the 12 Pennsylvania analyses which the station officials have selected, Prof. R. D. Gardner mentioned some of their advantages. "Reduction in number of analyses," he said, "saves in storage space and facilities; saves in printing of bags and tags; saves in bookkeeping and accounting; saves in loss of time in mixing and reduces the work of the state control officials.

The Pennsylvania list is as follows: 0-12-6; 2-12-2; 2-10-6; 2-12-4; 3-10-6; 4-8-4; 4-8-6; 4-12-0; 4-12-4; 5-10-6; 6-8-4; 0-8-4.

The first figure in each analysis indicates the per cent of ammonia; the second, the per cent of phosphoric acid, and the third, the per cent of potash.

It is expected, as a result of the conference, that by means of concerted action the existing fertilizer practice in the state will be rapidly simplified and made more economical from the standpoint of both the farmer and the manufacturers. Similar recommendations have been made in Maryland and other states.

J. B. John President of Sandusky Cement Company

THE board of directors of the Sandusky Cement Co., Cleveland, Ohio, announce that J. B. John has been elected to the office of president and general manager.

Mr. John is already vice-president and general manager of the Newago Cement Co. and vice-president of the Petoskey and Manitowoc Cement companies. He will retain his connection with these companies in the same capacity.

Lime in Relation to Fertilizer

THREE-FOURTHS of Pennsylvania's soils are acid, according to Prof. J. W. White, and a large proportion of this great soil area is sufficiently acid to inhibit the normal growth of the usual farm crops, even when mineral fertilizers are used, without lime.

On the DeKalb soil a complete fertilizer applied without lime has produced 7846 lb. of dry matter per rotation, as compared to 18,236 lb. where the same kind and amount of fertilizer was used on limed land. Where lime was used without fertilizers the yield of dry matter was only 3898 lb. The yield was therefore increased 132 per cent with lime and fertilizers as compared to fertilizers alone. On Volusia soil, a complete fertilizer used on unlimed land produced 10,380 lb. of dry matter per rotation, as compared to 16,600 lb. where the same fertilizer was applied to limed land. On the Westmoreland soil a complete fertilizer produced 10,325 lb. of dry matter per rotation on unlimed land as compared to 14,852 lb. when used on limed soil.

On these acid soils commercial fertilizers will not show their real value. Many farmers have refused to buy the same fertilizers the second season because they failed to see a pronounced benefit, when the fault was not that of the fertilizers used, but the lack of lime.—*American Fertilizer.*

Utilization of Waste Limestone at Lime Plants

THOUSANDS of tons of pure limestone in sizes under ¼-in. are either entirely wasted at many lime plants or are sold for uses that brings a very small return to the producer. The Department of the Interior, through the Bureau of Mines, has undertaken a study of possible methods of utilizing such material, the study relating particularly to methods of burning it into lime. Preliminary work has been done at the non-metallic minerals station of the Bureau of Mines, New Brunswick, N. J., on present uses of waste limestone and on the success with which the rotary kiln is used with fine materials. Arrangements were made for field investigations at several Pennsylvania plants.

John Evans Lime and Stone Co. Starts Its New Plant

THE John Evans Lime & Stone Co., of Marion, Ohio, resumed operations recently, with a complete new plant of modern steel construction. The old plant, a frame structure that had been in use for many years, was destroyed by fire on the night of August 6.

Included in the new plant is an elevator and crusher of the latest design. All of the old bins and other equipment have also been replaced with steel construction.

Business has been suspended by the Evans company ever since the fire, all attention being given during the last two months to the work of reconstruction. The plant resumed operations with a force of about 40 men.

New Arkansas Lime Plant

THE Arkansas Lime Company is considering erection of a large plant on the Cushman branch of the Missouri Pacific railroad, about six miles north of Batesville, Ark., to manufacture lime and its products from the unlimited material available in that section. The plant is estimated to cost $150,000. The Missouri Pacific railroad has agreed to build a switch track to the plant at a cost of $100,000, the cost of which is to be met equally by the railway company and the lime company.

A proposition was made to the Chamber of Commerce of Batesville that if the city would raise $5000 toward building the switch the plant would be built at once. The committee secured more than $2000 the first day, and expects to raise the entire fund.

Lime Manufacturer Leaves Money for Concrete Sidewalks

A BEQUEST of $10,000 for cement sidewalks, to be built in Cheshire, Mass., is made in the will of former State Senator George Zebedee Dean, lime manufacturer. Mr. Dean was born in Cheshire, spent his life in that town and died there in his 80th year. The value of the estate is estimated at $125,000. The sidewalk bequest is to be paid to the town treasurer in five annual installments of $2000, and the walks are to be built according to the advice of competent engineers.

Mr. Dean was in the state senate when W. Murray Crane was governor. They were close friends for years, and political writers of the time often referred to Mr. Dean as "Governor Crane's shadow." Mr. Dean became famous as the only man in the senate who wore top boots.

The town of Cheshire is given $2500 for a fence to be built about the town cemetery, and also $500, the income to be used for the care of neglected lots in the cemetery. Other public bequests follow: To Union Lodge of Free and Accepted Masons of Cheshire, $500, for the benefit of sick or destitute persons; to Cheshire Library Association, to Baptist and Methodist churches of Cheshire, each $500; to Industrial Union Training School and Orphanage at Southern Pines, N. C., to Berkshire Industrial School at Canaan, N.Y., each $250; to Society for Prevention of Cruelty to Animals, $200. Employes of the Cheshire Lime Mfg. Co. get from $25 to $100 each, according to length of service.

Accident in Ohio Limestone Mine

A DRILLER in an underground lime mine at Newstead, near Akron, Ohio, was killed recently by the premature explosion of a blast. Twelve holes had been loaded and four of them went off from some cause not stated. Two men were working at the face, which was nearly a mile back in the tunnel. One man escaped but the other was caught by the falling rock.

Charles Spengler, general superintendent, and Thomas Thomas, mine superintendent, headed the relief party that dug through the fallen rock. They were overcome by the powder fumes, but recovered shortly afterward.

Lower Freight Rates Demanded on Agricultural Limestone

WM. J. ANDERSON, writing in *Hoards Dairyman*, says in regard to the proposal to lower rates on agricultural limestone in **Wisconsin:**

A rate case of general interest to farmers and everybody concerned with the agricultural interests of the state was filed recently with the Railroad Commission by F. M. Elkinton, of Milwaukee, on behalf of the Waukesha Lime and Stone Co., the Wisconsin Limestone Co., the Mayville White Lime Works and other producers of agricultural limestone in this state. The use of that commodity as a fertilizer has become so widespread throughout the state that it is no longer a luxury but a necessity. The complaint recites that there is only a limited area in southeastern Wisconsin where limestone of proper fertilizing content is found and that its use is statewide. At the present time it moves on crushed stone rates for single line movements, but there is a scale of joint rates over certain lines which the petitioners feel is too high. Mr. Elkinton states in his complaint that the level of the present rates deters the farmer from buying and that if for no other reason the economic condition of the farmers would justify the maintenance of lower rates than at present effective. He asks specifically for lower single line and joint rates, which will enable the farmer to buy, and maintains that the increased productivity of the soil resulting from the application of limestone will more than compensate the carriers for the maintenance of lower rates. The case has not yet been set for hearing by the commission, but its course and outcome will be watched with interest by all connected with the agricultural industry in the state.

[The point made in the above is worth noting. In many localities the free delivery of agstone might so increase the yield that the *net* tonnage carried by rail would be greater.—Ed.]

Union Rock Co. Planning to Crush 20,000 Tons Per Day

The No-Limit Market of Los Angeles

THE Union Rock Co., of Los Angeles, already known as one of the largest producers of crushed rock in the United States, is preparing to further increase its capacity.

The company has secured the services of C. B. Clyne to design two new crushing plants. The largest of these will have a capacity of 5000 tons per day and the other a capacity of 3000 tons.

Mr. Clyne has been well known in the mining industry of the West as a designer of mills for crushing and treating ore. He is one of the many engineers who are now applying the skill and experience of the years spent in metallic industries to the design of plants in the now more important non-metallic industries.

It is expected that the larger of these plants will be in operation in February of next year and that the smaller will begin production by the first of May.

With these two new plants, the Union Rock Co. will have the enormous production capacity of 20,000 tons per day, including crushed rock, sand and gravel.

It seems unbelievable that so large an amount of construction material could find a market in a city and surrounding district already so well provided with crushing plants. It is said that there are 50 plants within the limits of the city of Los Angeles alone. But the success of the Union Rock Co. is proof that it knows its market and has decided to build only after having assured itself of an outlet for its production.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert,
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning November 26:

Central Freight Association

7462. Crushed stone. Middlepoint, Ohio, to Napoleon, Ohio. Present, 90 cents per net ton; proposed, 80 cents per net ton.

7463. Crushed stone. Lima, Ohio, to Oxford, Ohio. Present, 16½ cents; proposed, $1.10 per net ton.

7464. Silica molding sand. Henlein, Pa., to Vandergrift, Pa. Present, $2.27 per net ton; proposed, $1.80 per net ton.

7465. Sand and gravel. Merom and Riverton, Ind., to Shattuc and Bechemeyer, Ill. Present, 6th class basis; proposed, $1.13 per net ton. Minimum weight, capacity of car.

7466. Crushed stone. Monroe, Mich., and Holland, Ohio, to Lamberville, Mich. Present, classification basis; proposed, 80 cents per net ton.

7498. Crushed stone. Lewisburg, Ohio, to Lima, Ohio. Present, 6th class basis; proposed, $1 per net ton.

7507. Stone, natural (other than granite, jasper, marble, onyx or bituminous rock), except carved, lettered, polished or traced (other than cut, carved or lettered building stone). Minimum weight 36,000 lb., viz.: blocks, pieces or slabs, N. O. I. B. N. in Official Classification (rough, quarried, sawed or dressed), curbing, cut, carved or lettered, building stone, flagging, paving, planned, rubble. To be loaded and unloaded by owners. Not subject to rules for constructing combination rates, Louisville, Ky., to points east of Western Termini of Eastern Trunk Lines. To Albany, N. Y.: present, 54 cents; proposed, 38½ cents. To Baltimore: present, 53½ cents; proposed, 37 cents. To Bellington, W. Va.: present, 45 cents; proposed, 32 cents. To Boston, Mass.: present, 59½ cents: proposed, 42 cents. To Cumberland, Md.: present, 45 cents; proposed, 32 cents. To Hagerstown, Md., via N. & W.: present, 53½ cents: proposed, 37 cents. To New York, N. Y.: present, 56½ cents; proposed, 40 cents. To Newport News, Norfolk, Va.; present, 53½ cents; proposed, 37 cents. To Philadelphia, Pa.: present, 54½ cents; proposed, 38 cents. To Rochester, N. Y.: present, 43 cents; proposed, 49½ cents. To Rockland, Me.: present, 59½ cents; proposed, 42 cents. To Strasburg, Va.: present, 53½ cents; proposed, 37. To Syracuse, N. Y.: present, 45 cents; proposed, 32 cents. To Utica, N. Y.: present, 51 cents; proposed, 36 cents.

Stone dressed or rough dressed, planed or sawed, minimum weight 36,000 lb. (to be loaded and unloaded by owner). From Louisville, Ky.:

To	Present	Proposed
Buffalo, N. Y.	36½	25½
Pittsburgh, Pa.	33	24
Erie, Pa.	35½	24½

7510. Crushed stone and crushed stone screenings. Bedford, Ind., to Utica, Ohio. Present, 22½ cents; proposed, $2 per net ton.

7512. Lime. Kenova, W. Va., to Wheeling, W. Va., Pittsburgh, Pa., and Youngstown, Ohio, also to Pittsburgh and arbitrary points. Present, Wheeling, W. Va., 16 cents, Pittsburgh, Pa., and Youngstown, Ohio 17½ cents; proposed, Wheeling, W. Va., and Pittsburgh, Pa., 13 cents, Youngstown, Ohio, 17 cents.

7514. Crushed stone and screenings. Greencastle, Ind., to stations on C. C. C. & St. L. R. R., Macksville to Paris, Ill., inclusive. Route via P. C. C. & St. L. R. R. Present, 76 cents per net ton; proposed, 63 cents per net ton.

Illinois Freight Association

1851. Sand and gravel, C. L., minimum weight 90 per cent of marked capacity of car, 98 cents per net ton from Conkey's Pit, Ill., to Joliet, 88 cents to Minooka, Seneca, Chillicothe and Peoria, Ill., and 84 cents to Marseilles, Ottawa, LaSalle, Peru and Marquette, Ill.

2044. Lime, C. L., minimum weight 60,000 lb., 10½ cents per 100 lb., from Hannibal, Mo., Marblehead and Quincy, Ill., to Edwardsville, Ill.

2187. Crushed stone, C. L., minimum weight capacity of car, 76 cents per net ton from Lehigh and Kankakee, Ill., and 89 cents from Thornton, Ill., to Sheldon, Ill., and Effner, Ind.

2188. Sand, gravel and crushed stone, C. L., $1.01 per net ton from Metropolis, Brookport, Cairo and East St. Louis, Ill., to Harrisburg, Ill.; on sand and gravel, C. L., minimum weight capacity of car, and 88 cents from Anna, 98 cents from Stoole-Hrause, $1.01 from Rosiview, $1.13 from Lehigh-Kankakee, Ill., and $1.26 from Thornton, Ill., to Harrisburg, Ill., on crushed stone, C. L., same minimum weight.

2195. Sand, gravel, and crushed stone, C. L., $1.13 per net ton from Cairo, Metropolis, Palestine and Lincoln, Ill., and $1.26 from Pekin and Peoria, Ill., to Shattuc and Beckemeyer, Ill., on sand and gravel, C. L., minimum weight capacity of car, and $1.13 from Rosiview, Ill., to same destinations on crushed stone, C. L., same minimum weight.

2095. Sand, molding, C. L., to establish rate of $1.40 per net ton, minimum weight 90 per cent of marked capacity of car, from Titchie, Ill., to Rockford, Ill.

2199. Sand, gravel, and crushed stone, C. L., $1.13 per net ton, Alton, Ill., to stations on the B. & O. R. R., Springfield, Ill., Rockford, Taylorville, Rochester and Pope, Ill., etc.

2213. Crushed stone, carloads, minimum weight marked capacity of car, $1.13 per net ton from Lehigh and Kankakee, Ill., and $1.26 from Thornton, Ill., to Trilla, Ill.

Southern Freight Association

11762. Sand, C. L., from Norfolk Southern R. R., Electric Division, stations to Virginian Ry. stations, viz., Pine Beach Branch, Beckley, W. Va., to Prestonburg, W. Va., inc., White Oak Branch, Wolfe Creek Extension. Present rate, $1.93; proposed rate, $1.68 per net ton, based on Norfolk, Va., combination using proposed required by N. S. R. R. up to Norfolk, plus rate of $1.51 per net ton beyond.

11784. Crushed stone, C. L., from Newsom and Mimms, Tenn., to Ripley and Tiptonville, Tenn. Combination rates now apply. Proposed rates: To Ripley from Newsom, $1.62; from Mimms, $1.72; to Tiptonville from Newsom, $1.58; from Mimms, $1.68 per net ton. Basis: From Newsom, proposed Georgia joint line scale, less 10 per cent for the distance; from Mimms, usual differential of 10 cents higher than proposed from Newsom.

11819. (Cancels No. 11637.) Cement, C. L., from Birmingham, Boyles, North Birmingham and Leeds, Ala., to Tennessee Central R. R. stations east of Nashville, Tenn. It is proposed to reduce present rates to be the same as cement combination rates from Ragland, Ala. No change is proposed in the basis suggested in Submittal 11637, but the changes are in the total rates that will result from the application of the above basis.

Southwestern Freight Bureau

10030. Cement. To establish rate of 23½ cents per 100 lb. on cement, C. L., from Ada, Okla., to stations on the A. & V. R. R., except Vicksburg, Miss. Remarks: The proposed rate is claimed necessary to place rates from Ada to destinations referred to on a proper relation to rates from points in the so-called Kansas Gas Belt.

10031. Cement. To amend Item 3350, S. W. L. Trf. 26X, applying on cement, C. L., from Texas points to Blackwell and Oklahoma City, Okla., by adding Houston, Texas, as a point of origin. Remarks: It is claimed that the present rate from Houston is out of line with rates published from Galveston and other points, and that as Houston is generally intermediate to Galveston on traffic to Oklahoma there is no justification for higher rates from Houston than from Galveston.

10062. Lime. To establish rate of 16 cents per 100 lb. on lime, carloads, from Johnsons, Ark., to Oklahoma points on the K. C. S. Ry., Stilwell to Peno, inclusive. Remarks: The purpose of this docket is to make revision in the rates from Johnsons to certain destinations on the K. C. S. Ry. on basis of approximately 1½ cents per 100 lb. under Ash Grove rate, because of materially shorter distances.

10071. Lime. To establish rate of 28½ cents per 100 lb. on lime, carloads, minimum weight 24,000 lb., from Dittlinger, Round Rock and McNeil, Texas, to Winnsboro, La. Remarks: As the proposed rate is that in effect from Dittlinger and other Texas producing points to Collinston, La., and nearby points, shippers contend there is no reason for not establishing the same rate to Winnsboro.

10090. Cement. To establish rate of 20½ cents on cement, carloads, minimum weight 50,000 lb., except when marked capacity of car is less, the actual weight, but not less than 40,000 lb., will apply, from Harrys and Eagle Ford, Texas, to Natchez, Miss. Remarks: It is contended that the rate to Natchez should not exceed rate to Vicksburg, New Orleans and Baton Rouge, which is 20½ cents.

10106. Cement. To establish rate of 21 cents per 100 lb. on cement, carloads, minimum weight 50,000 lb., from Ada, Okla., to Cedar Grove, La. Remarks: The proposed change is claimed necessary to place rate from Ada, Okla., to Cedar Grove on a proper relation to rate in effect from the Kansas gas belt.

10128. Gravel. To establish rate of 6½ cents per 100 lb. on gravel, carloads, minimum weight marked capacity of car, from Fullerton, La., to Jasper, Texas, and 7 cents per 100 lb. to Browndell, Texas. Remarks: It is claimed the present Class E rates on this traffic are too high to permit movement.

Texas-Louisiana Tariff Bureau

5701-TX. Lime, cement and plaster, C. L., rates on between points in Texas, also between Shreveport and Texas points. Proposition for shippers to amend description of item 2670, column 2, Texas Lines Tariff 2H, to apply on mixed carload shipments of lime with cement or plaster, retaining balance of restrictions as shown in item. Shippers state they are unable to understand present description and proposed change to clarify same.

Western Trunk Line

1564. Crushed stone, chatts (lead or zinc mine refuse) and stone (rubble or rip rap), C. L., from Jasper, Pipestone, Quartzite, Minn., and Sioux Falls, S. D., to Oakdale, Iowa. Present, classification basis; proposed, 12 cents per 100 lb. minimum weight, 90 per cent of marked capacity of car, except when weight of shipment loaded to full visible capacity of car is less than 90 per cent of marked capacity of car, the actual weight will apply, but in no case less than 50,000 lb.

3363. Sand, C. L., from Colona, Ill., to Oskaloosa, Iowa. Present, 11 cents; proposed, $1.40 per net ton. Minimum weight 90 per cent of the marked capacity of car; except when car is loaded to full visible capacity, actual weight will apply, but not less than 40,000 lb.

3541. Lime, C. L., from Port Byron, Ill., Dubuque and Maquoketa, Iowa, to St. Paul, Minn., and intermediate points. Present, 16 cents per 100 lb.; proposed, 14 cents per 100 lb. Minimum weight, 30,000 lb.

2090A (corrected). Rock, gypsum, C. L., minimum weight on, from Ft. Dodge, Iowa, to Illinois, Iowa, Minnesota, Nebraska, South Dakota, etc. Minimum weight, marked capacity of car furnished.

2090B (corrected). Rock, gypsum, C. L., from Ft. Dodge, Iowa, to Anna, Ill. Present, 19½ cents; proposed, 17½ cents. Minimum weight marked capacity of car furnished.

3545. Sand and gravel, C. L., from Grinter, Muncie, Turner and Sirridge, Kan., and other sand loading tracks in the Kansas City, Mo.-Kan., switching district, to industrial and team tracks within the Kansas City switching district. Present, Item 5, W. T. L. Trf. 156G, now reads: Rates named herein apply over one or more lines; proposed, to change to read: Rates named herein apply over one or more lines, but if it is possible to make deliveries by use of only two lines, rates will not apply over three or more lines; and if it is possible to make deliveries by use of only three lines, rates will not apply over four or more lines. Minimum weight, 90 per cent of marked capacity of car, except when weight of shipment loaded to full visible capacity of car is less than 90 per cent of marked capacity of car, the usual weight will apply. In no case shall the minimum weight be less than 40,000 lb.

3263B. Lime (calcium), acid phosphate, from Metropolis, Brookport and Cairo, Ill., to Atchison, Kansas City, Leavenworth and St. Joseph. Present, class basis; proposed, 33 cents per 100 lb. Minimum weight 50,000 lb.

New England Freight Association

5534. Lime, Dover Plains, N. Y., to Bath, Winslows Mills, Warren, Rockland, Thomaston, Me., 22 cents. Reason: Rate comparable with rate to more distant points on Me. C. R. R.

Trunk Line Association

11769. Cement, natural or portland (building cement), (not water-proofed) in cloth or paper bags, barrels or in bulk, C. L., minimum weight 50,000 lb., except when for carrier's convenience cars of less capacity are furnished, in which case minimum weight will be the marked capacity of car, but in no case less than 40,000 lb. Alsen, N. Y., to stations on the N. Y. C. R. R., 130th street, New York City, Croton on the Hudson, to Garrison, 15½ cents; to Port Morris, 16 cents per 100 lb.

Quarried from Life

By Liman Sandrock

A Gravel Producer with the Strength of His Convictions

OUR industry probably best knows Horatio S. Earle as the head of the Genessee Gravel Co., Earlstead, Mich.; his own state knows him best as the "Father of Michigan's Good Roads"; and in public life he has established a reputation for his sound American principles. In ROCK PRODUCTS for September 23, 1922, we quoted him thus:

"Let every man take a constructive interest in his country. Dismiss hatefulness. Develop fairness in criticism. Do something for the community whereby it may grow better. Make it a worthy place for the children who must carry on the wonderful traditions handed down by those who made it possible to know this land as America."

This is square shooting from a four-square shooter—and one of our people said it! It hits straight from the shoulder, and that self-same hitter has again struck out in remonstrance of what he believes deserves censure. Here's what we're getting at:

According to the Chicago *Tribune*, "Horatio S. Earle, for 35 years affiliated with a Detroit church, has resigned because he can no longer countenance coming from the pulpit political stump speeches and 'unceasing criticism of the best government on earth,' in place of solid religion."

"Dry" and election propaganda do not satisfy Mr. Earle, either, for he is again quoted: "When I go to church I want to hear the Gospel—not stuff that desecrates the pulpit. The churches used to be 'dry,' while I was a little 'wet.' Now, it's the other way. Churches stand for the Eighteenth Amendment, which can never be enforced, thus encouraging bootlegging and other ills.

"A Detroit minister has said: 'Any man who drinks intoxicating liquor today is a traitor like Benedict Arnold.' I say that if all such traitors were incarcerated, 75,000,000 would be jailed—and among them enough ministers to conduct the Sunday services.

"Preachers once confined themselves to the Christian religion; today, many of them are competing for space on the front page, and talk everything else but religion."

Our industry is first and foremost American—there is no doubt about it; its principles and practices are ample proof of this assertion; it treads on no man's conscientious beliefs; it meets on a common Christian ground—a Golden Rule foundation. Therefore, we feel justified in quoting Mr. Earle's viewpoint as reflecting in great measure the opinions of many of the men in the industry—and one of us has come out and declared himself.

Personally, we are glad that a sand and gravel man has had the grit to register his convictions in the daily press. Religious beliefs are so wholly individual, so strictly the personal business of each of us, that we hesitate to come out in open meeting and praise Brother Earle for his good old-fashioned Methodism. But why should we? Today, even the Almighty apparently is out-of-date and old-fashioned if measured with the yardstick of the daily press and many a pulpit. To those of us who do not hold with this modern notion such straightforward talk as Mr. Earle's is bracing and refreshing.

Horatio S. Earle

Sounds like we'd taken to preaching, too, doesn't it? If ever we do get good and set as a preacher, we're going to take our text from Abraham Lincoln's second inaugural address: "With malice toward none; with charity for all; with firmness in the right, as God gives us to see the right, let us strive to finish the work we are in."

And, may be, we'll give our congregation hell!

Ed Evans of "Our Town"

"IN OUR TOWN" is a chatty, pleasantly personal department in the Toledo *Times*. It aims to serve up to its readers homey, wholesome dishes that will tickle their mental palates and spread good cheer in their midst. It does all of this, and the men of Our Town doubtless deserve all the good things that are said of them.

We *know* this to be true in the case of Edward E. Evans, who was given brief mention recently in the aforesaid *Times*. Ed Evans, as many of us are aware, is the president and general manager of the Whitehouse Stone Co., and in addition president of the Ohio Macadam Association and chairman of the Highways Committee of the Toledo Chamber of Commerce.

Some time since we of ROCK PRODUCTS said a few pleasantly personal things, too, about Mr. Evans, adding a bit of history and recounting his various achievements in the stone industry and the part he has played as a patriotic American citizen. Ed never could be accused of being a shirk; he's a glutton for work, whether it be in the business or doing his duty by the state, as we of the industry know.

"Ed Evans isn't big physically, but he plays a big part in some of the big doings in his city and state," says the *Times*. More and more are the men of our industry taking a leading part in the civic affairs of Our Town. And rightly so, for their training and ability in a most essential business (although for a brief period we were once "non-essential," and when we were laboring our hardest) seem to peculiarly fit them for the serious duties now confronting the heads of our state and city and national governments.

Perhaps, some near day, we will provide a President of these sovereign forty-eight states from out of our industry. Who knows? We did have a President's Secretary in George Christian, at that! Anyhow, we are main proud of Ed Evans and glory in this recent newspaper recognition of his achievements and his sterling character.

Too Late!

Quarry Foreman: Send Larsen to me. I hear he was smoking in the dynamite shack.

One of the Crew: Here's a bit of his hat, now. The rest hasn't come down yet.

They Said It

"IT'S A DEAD TOWN where the police station is being slowly destroyed by the woodpeckers," a sand-lime brick producer told us the other day.

HEARD THIS ONE YET? Quarry man leaves his tinnous Elizabeth at his office door. Ten minutes later it's gone. Little kid tells him: "The ants has dragged yer Ford under the curbstone."

Editorial Comment

Concrete and the Pennsylvania R. R.

One of those rumors which comes from no one knows where, has recently been current and it asserted that the Pennsylvania R. R. was about to abandon concrete and return to cut stone for its smaller bridges. A letter to C. A. Shand, Chief Engineer of the Pennsylvania system, in reply to one from Rock Products, states that the Pennsylvania has no intention of abandoning concrete for either large or small bridges. The letter further says: "Where we have a good quality of stone in the vicinity of the bridge and it can be delivered as cheaply as concrete can be placed, we invariably use stone. This condition, however, is very rare." Of course, this is only good business, and has nothing to do with the merits of the two materials, for nobody would deny that cut stone makes a good bridge, and where it can be used more cheaply than concrete its use is indicated.

American Cement the Cheaper

It was somewhat startling to read the interview given to New York papers by President Struckmann, of the International Portland Cement Company, after his recent visit to Europe, and to learn that portland cement is actually selling at a lower price in the United States than the domestic price in most European countries. After all that has been said about the importation of European cement into this country, it now appears that American cement makers have little to fear from European competition. This is, as Mr. Struckmann points out, a tribute to the American genius for doing things on such a scale, and by the employment of every possible labor-saving device, that the cost of production is constantly lessened. Technically, it is possible that the manufacture and use of portland cement may have been studied in Europe to a degree not yet appreciated in this country, but the practical matter is that cement is produced in abundance here at a price which permits it to be freely used.

Better Outlook for Next Year

Last August a decided streak of pessimism began to appear in the various bulletins and the editorial pages of magazines that deal with business conditions, and this especially with reference to the outlook for new construction for the coming year. Building materials began to fall slightly in price and there were some significant matters (such as the announcement that the federal government was about to resume its construction program, which had been laid aside so as not to compete too strongly with private construction), which indicated that the pessimism might have some foundation. But in the short space of time which has elapsed there seems to have been a reversal of sentiment. Projected winter construction in New York is said, by the New York *Times,* to equal numerically that of last March, with a one-eighth increase in value. Road programs, so far as announced, seem to be at least as great as for the year now passing. That part of the southwest in which conditions were really bad is recovering rapidly, having passed its period of liquidation. The effect of the slight drop in prices seems to have been stimulating and the prospects for the coming year are encouraging.

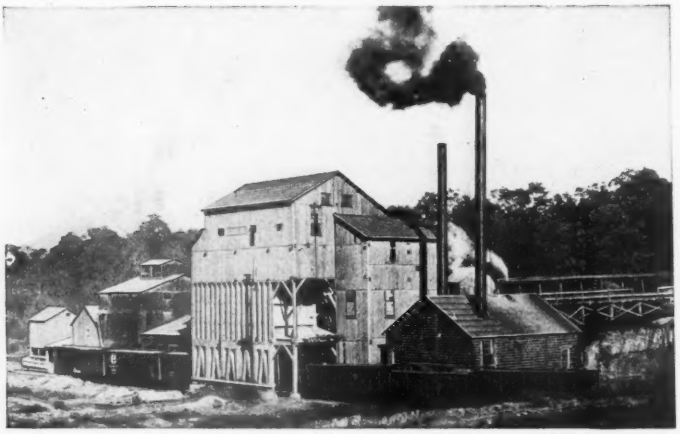
The Modern Lime Kiln

It has been thought that manufacturers of lime were rather more conservative than other manufacturers of rock products, but this would not be the opinion of one who had studied the modern lime kiln, several examples of which have appeared in recent issues of this paper. With its solid steel construction and mechanical methods of feeding and withdrawing the burned and cooled lime, the modern kiln is as fine an example of modern engineering practice as a blast furnace or any other device of the kind. In the last number of Rock Products this was shown in a striking way by the two articles which described an European lime kiln of the most modern type, and the Chinese kiln, of a type which is about as old as history. The two appear to be a long way apart, yet the evolution has taken place almost in the memory of living men. There are the ruins of old lime kilns which are not so different from the Chinese model still standing in some parts of the United States.

Earthquakes and Reinforced Concrete

An engineer of the George A. Fuller Co. has been studying the effect of the Japanese earthquake on the buildings erected by his company. That portion of his report that will especially interest Rock Products readers deals with concrete. It appears that the reinforced concrete floor slabs stood up very well, the only cracks being in those places where two buildings were joined together. In fact, the damage to all the buildings erected by American engineers was principally confined to the walls and partitions, which were of material that cracked under the stresses set up by the motion of the earth. In making recommendations for future construction, Mr. Sample recommends concrete for a number of parts of the building and especially recommends that the mix shall be "designed"

New Machinery and Equipment

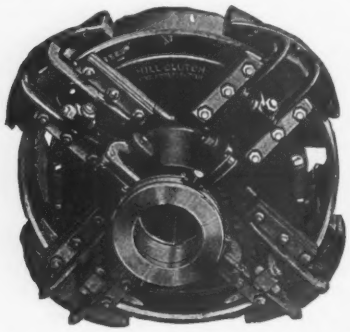


Plant of the Grove City Limestone Co. at Osborne, Pa.

Hill Clutch Works Well in Dusty Plants

THE pictures on this page were photographed in the Grove City Limestone Co.'s plant at Osborne, Pa. They show Hill clutches working under unusually severe conditions. A plant grinding dry limestone is necessarily a dusty place, especially in the neighborhood of the grinding mills, but the Hill clutches have been working all right in spite of the dust.

The Grove City Co. mines from an underground working about 400 tons per day.



The Hill clutch which has shown remarkable ability to run in dusty places

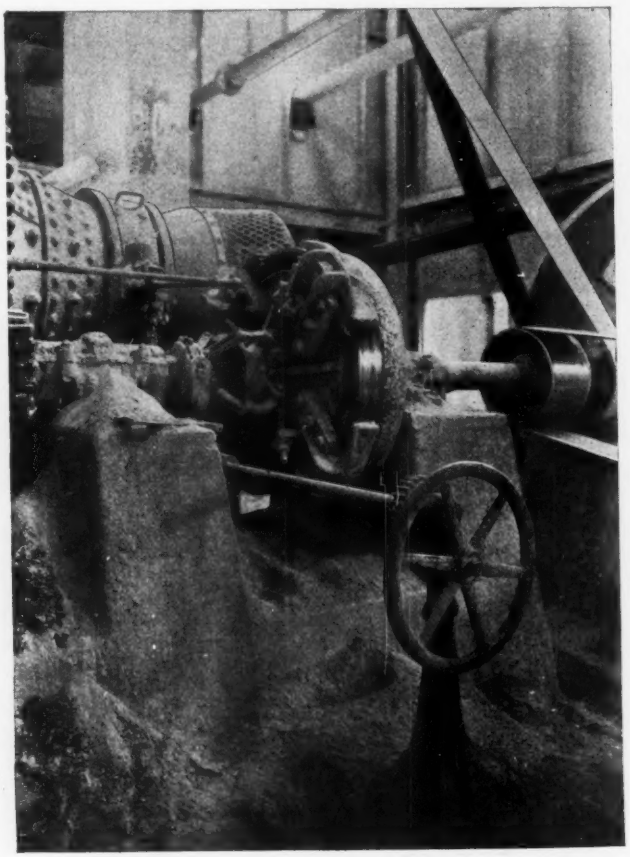
It is drawn out by horses and then trammed by steam locomotives to the head of the incline down which it is lowered to the plant. The product is washed and crushed and about 80 per cent is sold as concrete aggregate and for road building purposes. The remaining 20 per cent, which is the reject of the washing and crushing plant, is dried, ground and sacked for sale as agricultural limestone, or "agstone," as it is more often called today.

The mill for working up the reject into this product was built in 1921. The interior is shown in one of the cuts, which gives an excellent idea of the flow sheet. The tailings are first passed through the dryers and then elevated to a bin. From this bin they go to the Hardinge mill which reduces them to the required fineness. After grinding the material goes to a finished product bin from which it is drawn out and sacked.

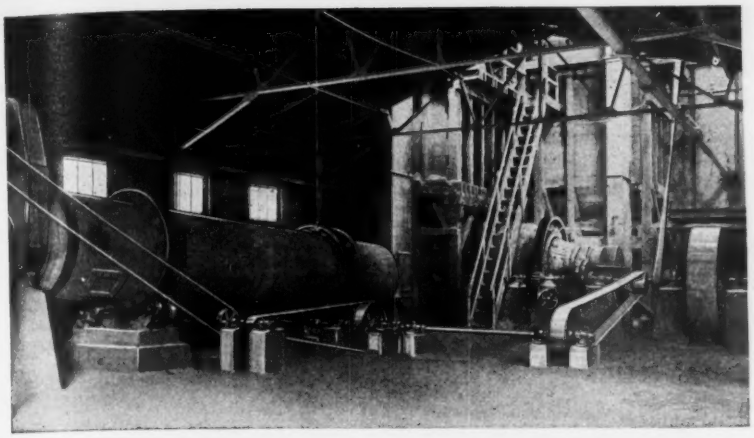
There are several interesting features of this operation. The underground working is one. This became necessary because the overburden became too heavy for economical quarrying. About 8 ft. of the rock is taken and the rest is left to assure a solid roof.

The plant is an excellent example of "straight line production," a form of design which gives the best result with the least effort.

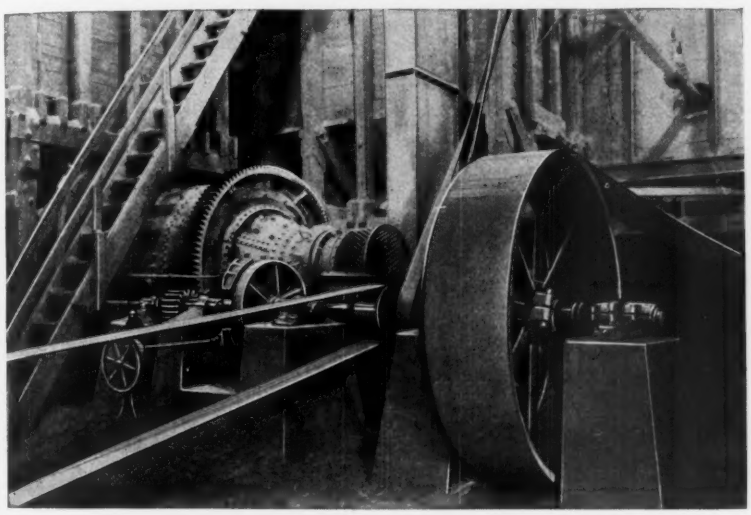
The feature of the plant, however, that will interest most operators and engineers who have had similar equipment in their charge is the excellent power transmission system which was furnished by the Hill



The photo was taken during the noon shut-down and shows the excellent condition of the clutch as well as the dusty situation in which it has to work



An excellent idea of the flow sheet of the plant may be had from this picture, which shows the dryer, Hardinge mill elevator, bins and sacker



Showing the application of the clutch to the Hardinge mill drive

Clutch Co. of Cleveland, Ohio. And the drives of the Hardinge mill and the adjacent bearings are especially interesting because they must work in a cloud of dust. One of the pictures shows these bearings and the clutch as they appear after the plant had been shut down for an hour at noon. The excellent condition of the clutch may be clearly noted.

Centrifugal force and fanning action keep the mechanism free for proper operation, with no chance of lodgment and accmulation to result in packing, which may prevent release after a period of working. So to have the clutch mechanism open and self-cleaning is better than to attempt to keep an enclosed clutch clean within by any dust-proofing scheme.

The photograph was taken after more than a year of service.

This plant is an interesting example of what may be done in working up wastes in the rock products industries, and also of good design and choice of equipment for the work.

The Lowden Patent Dryer

THE Lowden dryer belongs to the class known as hearth dryers, in which the material to be dried is spread out in a thin sheet on a hearth heated from below and moved forward at such a rate that the material is dry when it reaches the discharge point.

The advantage claimed for the Lowden dryer over other dryers of the hearth type is found in the mechanical action of the rabbles by which the material is carried forward. These have a chopping action as well as a push so that the material is constantly turned, and all lumps are broken up at the same time that it is moved forward.

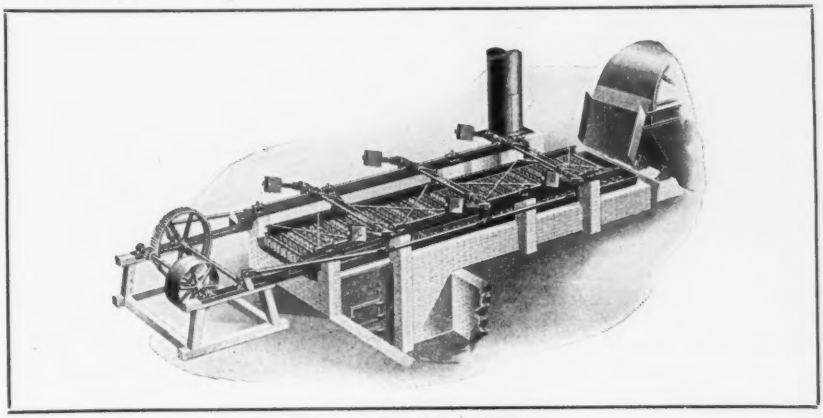
Anyone who has ever dried material of a clayey or sticky nature on a hot plate will readily appreciate the advantage of this chopping and stirring action. It is not so much a matter of applying heat to dry such material successfully as it is of letting the steam escape and allowing overheated portions of the material to come in contact with those which are still damp, in order to utilize the heat already supplied.

The hearth in the Lowden dryer is composed of cast-iron plates, tightly fitted, below which is a flue through which the heated gases from the furnace pass. The rabbles are made of steel and set in such a way that there is no tendency to work the material to the sides of the hearth. They can be adjusted both for lift and forward travel. This adjustment may be varied so that at one part of the hearth there may be a thick bed moving slowly and at another part a thin bed moving more rapidly. It is sometimes of advantage to work the bed in this way. Adjustability also makes it possible for the bed to be kept of even depth over all parts of the hearth.

The machine makes no dust as the shopping action does not stir the material nor agitate it sufficiently to raise the dust. There is no current of air to carry dust into the atmosphere as the material dries, as occurs with some other forms of dryer.

The makers claim other advantages such as visibility and accessibility of all the parts, a very light power consumption, and low maintenance. It effects a great saving when applied to those materials which have been dried on trays.

The Lowden Patent Dryer is made and sold by the Colorado Iron Works Co., Denver, Colo.



The Lowden Patent Dryer

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.40	1.40	1.30	1.10	.....
Buffalo, N. Y.	.90	.....	1.35	1.15	1.20	1.20
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25
Coldwater, N. Y.			1.50 per net ton all sizes			
Eastern Pennsylvania	1.35	1.35	1.45	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Prospect, N. Y.	.80	1.40	1.30	1.25	1.25	.....
Walford, Pa.	1.55	1.55	1.55	1.55	1.55	1.55
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Alton, Ill.	2.00	.....	1.75	.....	.....	2.00§
Bloomville, Middlepoint, Dunkirk, Bellevue, Ohio	1.00	1.10	1.10	1.00	1.00	1.00
Cypress, Ill.	1.25	1.35	1.35	1.25	1.20	1.15
Chicago, Ill.	.80	1.40	1.10	1.10	1.10	1.10
Dundas, Ont.	.90	1.35	1.35	1.25	1.10	1.10
Greencastle, Ind.	1.25	1.15	1.05	1.05	1.05	1.05
Krause, Columbia and Valmeyer, Ill.	1.20	1.20	1.35	1.35	1.20	1.20
Lannon, Wis.	.70	1.00	1.00	1.00	.90	.90
Linwood, Iowa	.80	.....	1.35	1.15	1.25	1.25
Mitchell, Ind.	1.00	.....	.....	.....	.....	.....
Montrose, Iowa	.....	1.50	1.60	1.55	1.45	1.40
St. Vincent de Paul, P. Q.	.85	1.20@1.45	1.15	1.05	.95	.95
Sheboygan, Wis.	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10	1.05@1.10
Southern Illinois	1.35	1.35	1.35	1.35	1.35	1.00
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.35	1.35	1.35	1.35
Stone City, Ia.	.75	.....	1.50†	1.40	1.30	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25‡	2.25‡	2.25‡	2.00	2.00
Waukesha, Wis.	1.15	1.15	1.15	1.15	1.15	1.15
SOUTHERN:						
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15	.....
Bridgeport, Texas	1.10	1.40	1.35	1.35	1.25	1.25
Cartersville, Ga.	1.50	1.50	.....	1.15	1.00	.....
Chickamauga, Tenn.	.80@1.00	1.00@1.25	.....	.85@1.00	.85@1.00	.....
Dallas, Texas.	1.00	1.25	1.25	1.25	1.20	1.10
El Paso, Texas	1.00	1.00	1.00	1.00	.....	.....
Ft. Springs, W. Va.	.60	1.70	1.70	1.50	1.40	.....
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Graysville, Ga.	1.00@1.25	.85@1.25	.....	.85@1.00	.85@1.00	.....
Ladds, Ga.	.....	.....	1.40	1.40	1.40	.....
Morris Spur (near Ft. Worth), Tex.	1.10	1.35	1.30	1.25	1.25	1.20
WESTERN:						
Atchison, Kans.	.50	2.10	2.10	2.10	2.10	1.60||@2.10
Blue Spr'gs and Wymore, Neb.	.20	1.45	1.45	1.35	1.25	1.20
Cape Girardeau, Mo.	1.35*	1.35*	1.35*	1.35*	1.10*	.....
Kansas City, Mo.	1.00	1.65	1.65	1.65	1.65	1.65

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.50	1.35	1.15	1.00	.....
Dresser Jct., Wis.	1.00	2.25	.....	1.75	2.00	.....
Duluth, Minn.	1.00	2.25	2.00	1.50	1.40	.....
E. Summit, N. J.	2.00	2.50	2.10	1.80	1.60	.....
Eastern Massachusetts	.85	1.75	1.75	1.40	1.40	1.40
Eastern New York	.75	1.50	1.50	1.30	1.40	1.30
Eastern Pennsylvania	1.25	1.55	1.50	1.40	1.40	1.40
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.50@2.00	1.35@1.50	1.15@1.25	1.00@1.10	.....
Oakland, Calif.	1.75*	1.75*	1.75*	1.75*	1.75*	1.75*
Richmond, Calif.	.50*	.....	1.65*	1.50*	1.50*	.....
San Diego, Calif.	1.80@1.90	.....	1.60@1.80	1.35@1.55	1.35@1.55	.....
Spring Valley, Calif.	.70	1.55	1.50	1.40	1.35	1.35
Springfield, N. J.	1.75	2.00	2.00	1.80	1.60	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Atlanta, Ga.—Granite	1.47	2.07	2.07	1.97	1.97	.....
Buffalo, N. Y.—Granite	.90	.....	1.20	1.00	1.05	1.10
Berlin, Utley and Red Granite, Wis.	1.60	1.70	1.60	1.50	1.40	.....
Columbia, S. C.—Granite	.50	.....	2.00	1.75@2.00	1.75	.....
Eastern Penna.—Sandstone	.85	1.60	1.55	1.35	1.35	1.30
Eastern Penna.—Quartzite	1.20	1.35	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	.75	1.75	1.75	1.25	1.25	.....
Los Angeles, Calif.	2.00	2.00	1.85	1.75	1.65	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	.....	.....	1.25@1.50
Sioux Falls, S. D.—Granite	1.00	1.60	1.55	.....	1.50	.....

*Cubic yd. †1 in. and less; ‡prices include 90c freight; ||rip rap, 1.60 per ton; §flux.

Agricultural Limestone

(Pulverized)

Chaumont, N. Y.—Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$—Thru 100 mesh; sacks, 4.00; bulk	2.50
Branchton, Pa.—Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$; 60% thru 100 mesh; 45% thru 200 mesh; 100% thru 20 mesh; sacks, 5.00	3.50
Hillsville, Pa.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$, 75% thru 100 mesh; sacks, 5.00; bulk	3.00
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
New Castle, Pa.—94% $CaCO_3$, 1.40% $MgCO_3$—75% thru 100 mesh, 94% thru 50 mesh; sacks, 5.00; bulk	3.50
Walford, Pa.—Analysis, 50% thru 100 mesh; 4.50 in paper; bulk	3.00
Watertown, N. Y.—Analysis, 96 to 99% $CaCO_3$; .02% $MgCO_3$; 90% thru 100 mesh; bulk, 3.00; sacks	4.50
West Stockbridge, Rockdale, Mass., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
Alton, Ill.—Analysis, 98% $CaCO_3$; 0.5% $MgCO_3$; 90% thru 4 mesh	2.00
Belleville, Ont.—Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk	2.50
Cypress, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$; 50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh	1.50
Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh	1.80@3.80
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 80-lb p. sacks 5.00; bulk	3.50
Piqua, Ohio—100% thru 100 mesh; bags, 7.00; bulk	5.50
80% thru 100 mesh; bags, 5.00; bulk	3.50
50% thru 100 mesh; bags, 4.00; bulk	2.10@ 2.25
Waukesha, Wis.—Analysis, neutralizing equivalent 107.38% $CaCO_3$; 99% thru 10 mesh, 55% thru 60 mesh; bulk	2.35
200-mesh bags ex., returnable	4.50
Hot Springs, N. C.—50% thru 100 mesh; sacks, 4.25; bulk	2.70
Knoxville, Tenn.—80% thru 100 mesh, bags, 3.95; bulk	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200 lb. burlap bag, 4.00; bulk	2.75
Mountville, Va.—Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—50% thru 100 mesh; 100% thru 20 mesh; sacks	5.00
Colton Calif.—Analysis, 95% $CaCO_3$, 3% $MgCO_3$—all thru 20 mesh—bulk	4.00
Lemon Cove, Calif.—Analysis, 94.8% $CaCO_3$, 0.42% $MgCO_3$; 60% thru 200 mesh; sacks, 5.25; bulk	4.50
Dundas, Ont.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$—35% thru 100 mesh; 50% thru 50 mesh; 100% thru 10 mesh; bagged, 4.75; bulk	3.00

Agricultural Limestone

(Crushed)

Bellevue, Ohio—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh	1.25
Bettendorf, Iowa, and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Buffalo, Iowa—90% thru 4 mesh	1.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; 90% thru 50 mesh	1.50
Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$; 90% thru 4 mesh	.80
Columbia, Ill., near East St. Louis—½-in. down	1.25@ 1.80
Elmhurst, Ill.—Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$; 50% thru 50 mesh	1.25
Huntington and Bluffton, Ind.—Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; about 20% thru 100 mesh	1.25

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Agricultural Limestone

(Continued from preceding page)

Greencastle, Indiana.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh 2.00
Kansas City, Mo.—50% thru 100 mesh 1.25
Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh 1.20
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00
Screenings (¼ in. to dust) 1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 100% thru 4 mesh; 83% thru 10 mesh; bulk 1.25
Milltown, Indiana.—Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 35% thru 50 mesh ..... 1.40@ 1.65
Montrose, Iowa.—90% thru 100 mesh .. 1.25
Narlo, Ohio.—Analysis, 56% $CaCO_3$ 43% $MgCO_3$; limestone screenings, 37% thru 100 mesh, 55% thru 50 mesh, 100% thru 4 mesh ..... 1.50@ 2.00
Ohio (different points), 20% thru 100 mesh, bulk ..... 1.25@ 1.50
Piqua, Ohio—100% thru 4 mesh 1.25
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@ 1.40
Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ½-in. mesh 1.30
Stone City, Iowa. — Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75
Toledo, Ohio.—¼ in. to dust, 30% thru 100 mesh 1.50
Waukesha, Wis.—No. 1 kiln dried 2.00
No. 2 Natural 1.75
Alderson, W. Va. — Analysis, 90¼ $CaCO_3$; 90% thru 50 mesh 1.75
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$; 90% thru 50 mesh 3.00
50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh 2.75
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 50% thru 100 mesh 1.50
Ladds, Ga.—Analysis, 52% $CaCO_3$, 46% $MgCO_3$—all passing 10 mesh ... 1.50@ 1.75
Garnett, Okla.—Analysis, 80% $CaCO_3$, 3% $MgCO_3$; 100% thru 4 mesh ..... .50
Kansas City, Mo., Corrigan Siding—50% thru 100 mesh; bulk 1.80
Tulsa, Okla.—90% thru 4 mesh ..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

Glass Sand:

Berkeley Springs, W. Va. ..... 2.25@ 2.50
Cedarville and South Vineland, N. J.—Damp, 1.75; dry 2.25
Cheshire, Mass.—24 mesh, 5.00; 40 mesh, 6.00; 100 mesh 7.00
Columbus, Ohio ..... 1.50@ 1.75
Dunbar, Pa.—Damp 2.50
Falls Creek, Pa. 2.25
Hancock, Md.—Damp, 1.50; dry 2.00
Klondike and Pacific, Mo. ..... 2.00@ 2.50
Mapleton, Pa. ..... 2.25@ 2.50
Mapleton Depot, Pa. 2.50
Massillon, Ohio 3.00
Michigan City, Ind. ..... .50
Millville, N. J. 2.00
Mineral Ridge, Ohio 2.50
Montoursville, Pa. (green) 2.00
Oregon, Ill. 2.50
Ottawa, Ill. 1.50
Pittsburgh, Pa.—Dry, 4.00; damp 3.00
Ridgway, Pa. 2.50
Rockwood, Mich. ..... 2.50@ 2.75
Round Top, Md. 2.25
Sands, Pa. 2.50
San Francisco, Calif. ..... 3.00@ 3.50
St. Louis, Mo. ..... 2.50@ 3.00
St. Mary's, Pa. 2.25
Thayers, Pa. ..... 2.00@ 2.50
Utica, Ill. ..... 1.25@ 1.50
Zanesville, Ohio ..... 2.00@ 2.50

Foundry Sand:

Albany, N. Y.—Core 1.60
Molding fine, brass molding 2.50
Molding coarse 2.25
Sand blast 4.00
Allentown, Pa.—Core and molding fine 1.75@ 2.00
Arenzville, Ill.—Molding fine ..... 1.50@ 1.75
Brass molding 1.75
Beach City, Ohio.—Core, washed and screened ..... 2.00@ 2.50
Furnace lining ..... 2.50@ 3.00
Molding fine and coarse ..... 2.25@ 2.50
Cheshire, Mass.—Furnace lining, molding fine and coarse 5.00
Sand blast ..... 5.00@ 8.00
Stone sawing 6.00
Cleveland, Ohio.—Molding coarse ..... 1.50@ 2.00
Brass molding ..... 1.50@ 2.00
Molding fine ..... 1.50@ 2.25
Core ..... 1.25@ 1.50

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Wholesale Prices of Sand and Gravel

Prices given are per ton, f. o. b. producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge and So. Hts., Pa.	1.25	1.25	.85	.85	.85	.85
Attica, N. Y.	.75	.75	.75	.75	.75	.75
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		1.00		1.25		1.75
Farmingdale, N. J.	.48	.48	.65		1.10	
Machias, N. Y.	.75	.75	.85	.85	.85	.85
Pittsburgh, Pa.	1.25	1.25	.90	.85	.85	.85
Portland, Me.		.50	1.75		1.35	1.25
Washington, D. C.—Rewashed, river	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Anson, Wis.	.35@ .40	.35@ .40				.80@ .85
Barton, Wis.		.40@ .60		.50@ .70	.50@ .70	
Beloit, Wis.		.70			.80	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75	.75@1.00	.75	.75@1.00	.75@1.00	.75
Covington, Ind.	.75	.75	.75	.75	.75	.75
Des Moines, Iowa	.50	.50	1.25	1.60	1.60	1.60
			Unwashed ballast, .50 ton			
Attica, Ind.	.75	.75	.75	.75	.75	.75
Moronts, Ill.	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Oregon, Ill.	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Ottawa, Ill.	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Yorkville, Ill.	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70	.60@ .70
Dresden, Ohio	.70	.60	.60		.90	
Eau Claire, Wis.	.40@ .50	.40	1.00@1.25			.85
Elkhart Lake, Wis.	.60	.60	.70	.70	.70	.70
Grand Rapids, Mich.		.50		.70		.80
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.	.50	.50		.75		.75
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75	.75		.65@ .75	
Mason City, Iowa	.65	.65	1.75	1.70	1.65	1.65
Mankato, Minn.	.40‡	.40				
Milwaukee, Wis.	1.11	1.11	1.36	1.36	1.36	1.36
Moline, Ill.	.60	.60	Concrete gravel, 40% G., 60% S., .90			
Palestine, Ill.	.75	.75	.75	.75	.75	.75
St. Louis, Mo., f.o.b. cars	1.20	1.45	1.65§	1.45	1.65	1.45‖
St. Louis, Mo., deliv. on job	2.05	2.20	2.35	2.15		2.10
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
Summit Grove, Ind.	.75	.75	.75	.75	.75	.75
Terre Haute, Ind.	.75	.60	1.00	1.00	.75	.75
Waukesha, Wis.	.50	.50	.80	.80	.80	.80
Winona, Minn.	.40	.40	1.75	1.50	1.40	1.40
			(.05 ton discount 10 days)			
Zanesville, Ohio		.60	.60	.90	.90	
SOUTHERN:						
Birmingham, Ala.	1.29	1.29	2.79	1.79	1.64	1.54
Brookhaven, Miss.; Roseland, La.	.50@ .75	.25@ .50	1.00@1.50	1.00@1.25	.85@1.00	.85@1.00
Charleston, W. Va.	all sand 1.40 f.o.b. cars		all gravel 1.50 f.o.b. cars			
Estill Springs, Tenn.	1.35	1.35		1.00	.85	.65
Ft. Worth, Texas		2.25	2.25	2.25	2.25	2.25
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	.75@1.00	1.00	1.20	1.20	1.20	
Lake Weir, Fla.		.50				
Memphis, Tenn.	1.00	1.00	1.80	1.80	1.80	1.80
New Martinsville, W. Va.	1.00	1.00			1.20	.80
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.			Kaw river sand .75 per ton f.o.b. plants			
Los Angeles, Calif.		.85@1.15	1.65	1.65	1.50	1.50
Pueblo, Colo.	1.10*	.90*			1.50*	
San Diego, Calif.	.50	.80@1.00	1.40@1.50	1.20@1.30	1.00@1.10	1.00@1.10
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash. (bunkers)	1.25*	1.25*	1.50*		1.25*	1.25*
Spring Valley, Calif.	.70	.80	1.40	1.35	1.25	1.25

Bank Run Sand and Gravel

City or shipping point	Fine sand, 1/10 in.	Sand, ¼ in.	Gravel, ½ in.	Gravel, 1 in.	Gravel, 1½ in.	Gravel, 2 in.
Atlanta, Ga.	.30@ .40	.30@ .40				
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Brookhaven, Miss.; Roseland, La.					.35@ .50	
Cape Girardeau, Mo.			River sand, .80 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dresden, Ohio					.25	
Dudley, Ky. (crushed sand)	1.00	1.00		.90		
East Hartford, Conn.			.65 per cu. yd.			
Elkhart Lake, Wis.	.60	.50				
Estill Springs, Tenn.						.85
Fishers, N. Y.		.60			.55@ .60	
Gainesville, Texas		.95				.55
Grand Rapids, Mich.						.60
Hamilton, Ohio					.70	
Hartford, Conn.		1.00*				
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Texas	.95					.55
Mankato, Minn.			Pit run gravel, .50			
Moline, Ill.	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.						1.55
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas		.80		1.50		1.30
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.			Gravel, .60 a ton			
York, Pa.		.95@1.10	(crushed rock sand)			
Zanesville, Ohio		.60	.60			

*Cubic yard. †Low prices, wholesale; high prices, retail; ‡¼ inch down; §⅝ inch and less; ‖2½ inches and less.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y.	2.35	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Erie, Pa.	Crushed run slag, 4 in. and less, 1.25@1.35						
Emporium, Pa.			1.25	1.25		1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.	All sizes, 1.50, f.o.b. Chicago						
Detroit, Mich.	All sizes, 1.65, f.o.b. Detroit						
Ironton, O.	2.05	1.45	1.80	1.45	1.45	1.45	1.45
Jackson, O.		1.35		1.35	1.35	1.35	1.35
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.50	1.35	1.35	1.35	1.35	1.35	1.35
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.35	1.25	1.25	1.25	1.25
Steubenville, Lowellville, Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Alabama City, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton, Roanoke, Low Moor, Ruesens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Adams, Mass.			7.00				2.90	
Bellefonte, Pa.		10.50*	10.50*	10.50*	9.00		8.50	1.80
Buffalo, N. Y.				12.00				
Berkeley, R. I.			12.00					2.30
Cassadaga, N. Y.			Agricultural marl 7.00					
Lime Ridge, Pa.							5.00a	
West Rutland, Vt.	13.50	12.00					11.00	3.20
West Stockbridge, Mass.								2.25
Williamsport, Pa.			10.00				6.00	
York, Pa. (dealers' prices)		11.50	11.50	12.50				1.85b
CENTRAL:								
Cold Springs, Ohio	12.50	11.00	10.00		9.00	11.00‖	10.00	
Delaware, Ohio	12.50	10.00	9.00	11.50	9.00		9.00	1.60
Gibsonburg, Ohio	12.50				9.00		10.00	
Huntington, Ind.	12.50	11.00	10.00				10.00	1.60c
Luckey, Ohio	12.50‡	11.00	9.00‡					
Marblehead, Ohio		11.00	10.00				10.00	1.60d
Marion, Ohio		11.00	10.00				10.00	1.80†
Mitchell, Ind.		12.00	12.00	12.00	11.00		10.00	1.60
Sheboygan, Wis.							10.00	
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00		
Woodville, O. (dlrs.' price)	12.50‡	11.00‡	10.00‡				10.00	1.60
SOUTHERN:								
Erin, Tenn.							8.50	1.50
El Paso, Texas							10.00	1.50
Karo, Va.							7.00	1.50
Knoxville, Tenn.	12.50	11.00	11.00	11.00	8.50		8.50	1.50
Ocala and Zuber, Fla.	13.00		9.00				10.00	1.70
Sherwood, Tenn.	12.50	11.00	11.00	11.00			8.50	1.50
Staunton, Va.					4.50		8.50	1.35
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. M.							12.50	15.00
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.40
Tehachapi, Calif.							13.00	2.10e

*Paper sacks; †180-lb. net, non-returnable metal barrel; ‡50-lb. paper bags, terms 30 days net, 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice; ‖ 80-lb. paper bags; (a) F. O. B. kilns; (b) 180 lbs. net; $2.85, 280 lbs. net; (c) wooden bbls.; (d) wooden, 1.60, steel, 180; e, wooden bbls.; steel bbls., 2.20.

Miscellaneous Sands

(Continued from preceding page)

Columbus, Ohio—Furnace lining	2.00@ 2.25
Molding fine	2.00@2.50
Molding coarse	1.75@ 2.50
Sand blast	3.50@ 5.00
Traction	.40@ .75
Brass molding	2.50@ 3.00
Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.15
Dunbar, Pa.—Traction	2.50
Dundee, Ohio.—Glass, core, sand blast traction	**2.50**
Molding fine, brass molding (plus 75c for winter loading)	**2.00**
Molding coarse (plus 75c for winter loading)	**1.75**
Eau Claire, Wis.—Sand blast	3.25@ 3.75
Falls Creek, Pa.—Molding, fine and coarse	**1.75**
Sand blast	**2.00**
Traction	**1.75**
Franklin, Pa.—Core	**2.00**
Furnace lining	**2.50**
Molding fine and coarse	**2.00**
Brass molding	**2.00**
Greenville, Ill.—Molding coarse	1.30@ 1.60
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled	**.80**
Bank run	**.65**
Kansas City, Mo.—Missouri river core	.80
Kasota, Minn.—Molding fine	1.60@ 1.85
Molding coarse, stone sawing	1.45@ 1.75
Klondike, Pacific, Gray Summit, Mo.—Molding fine and coarse, stone sawing, roofing sand	2.00
Mapleton Depot, Pa.—Brass molding	2.00
Molding fine	2.00
Roofing sand	2.50
Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse; damp, 2.00; dry	**2.75**
Massillon, Ohio—Molding fine, coarse, furnace lining and core	3.00
Traction	2.75
Michigan City, Ind.—Core, traction	.50
Millville, N. J. Core	2.00
Mineral Ridge, Ohio.—Core, furnace lining, molding fine and coarse, roofing sand, sand blast, stone sawing (green)	2.00
Traction (green)	1.85
Montoursville, Pa.—Core	1.25@ 1.40
Furnace lining	1.20
Traction	1.25
New Lexington, Ohio—Molding fine	2.25
Molding coarse	2.00
Oregon, Ill.—Core	1.50@ 2.00
Sand blast	4.00
Stone sawing	2.00@ 2.50
Ottawa, Ill.—Molding, coarse (crude)	.85@ 1.00
Ottawa, Minn.—Crude silica sand	.75@ 1.00
Ridgway, Pa.—Core	2.00
Furnace lining, molding fine, molding coarse	1.25
Traction	2.25

Miscellaneous Sands

(Continued)

Rockwood, Mich.—Core	2.00@ 2.50
Roofing	2.75@ 3.00
Sand blast	3.75
Round Top, Md.—Roofing sand	2.25
Traction	1.75
San Francisco, Calif. (washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@ 3.50
(Direct from pit)	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
St. Louis, Mo.—Red heavy molding	1.50@ 2.25
Red fine	1.50@ 2.00
Molding fine and brass	2.00@ 3.00
Skein core	1.75@ 2.25
White core sand	1.00@ 1.75
Sand blast	2.00@ 4.50
Furnace lining	1.50@ 2.50
Roofing sand	1.00@ 1.50
Stone sawing	1.25@ 2.00
Tamalco, Ill.—Molding coarse	1.40@ 1.60
Thayers, Pa.—Core	2.25
Furnace lining, molding fine and coarse	1.25
Traction	2.25
Utica, Ill.—Furnace lining	1.00@ 1.50
Molding fine	.75
Molding coarse	.85
Warwick, Ohio—Furnace lining, green	1.75
Core, green, 2.00; dry	2.50
Molding fine, molding coarse, green, 2.00; dry	2.75
Traction	2.75
Brass molding	2.25
Zanesville, Ohio—Molding fine, brass molding	1.75@ 2.00
Molding coarse	1.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Asheville, N. C.—Best white and 200-mesh (per ton)	8.00
Yellow (per ton)	9.00
Red (per ton)	13.00
Baltimore, Md.—Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel workers' crayons, per gross	1.25
Chatsworth, Ga.—Crude talc (grindings)	5.00
Ground talc (150-200 mesh), bags	8.00@15.00
Pencils and steel workers' crayons, per gross	1.00@ 2.50
Chester, Vt.—Crude talc	3.50@ 4.00
Ground talc (150-200 mesh), bulk	6.50@ 8.50
Including bags	7.50@ 9.50
Emeryville, N. Y.—325 mesh	14.75
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run) per 2000-lb. ton	3.00@ 3.50
Ground (20-50 mesh), bags	6.50@ 8.00
(150-200 mesh), bags	9.75@12.50
Keeler, Calif., bulk	20.00@30.00
Extra in carloads of 6000 lb.	
Los Angeles, Calif.—Crude	15.00@22.00
Marshall, N. C.—Crude talc, bags	6.00
Ground talc (150-200 mesh); bags	8.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
Ground talc (150-200 mesh), bulk	10.00@22.00
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	8.50@15.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	7.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.50
(Bags extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.50

Rock Phosphate

(Raw Rock)

Per 2240-lb. Ton	
Centerville, Tenn.—B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68-72%	5.50@ 6.00
Mt. Pleasant, Tenn.—Analysis, 65% B.P.L. (2000 lb.)	6.00@ 6.50
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.	7.00
Paris, Idaho.—2000 lb. mine run, B.P.L. 75%	4.50@ 5.00
Ottawa, Minn.—All crude silica sand	.75@ 1.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Clay Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$10.20	$8.40	$8.10	$7.50
24x14	10.20	8.40	8.10	7.50
22x12	10.80	8.70	8.40	7.80
22x11	10.80	8.70	8.40	7.80
20x12	12.60	9.00	8.70	8.10
20x10	12.60	9.00	8.70	8.10
18x10	12.60	9.00	8.70	8.10
18x 9	12.60	9.00	8.70	8.10
16x10	12.60	8.70	8.40	7.80
16x 9	12.60	8.70	8.40	7.80
16x 8	12.60	8.70	8.40	7.80
18x12	12.60	9.00	8.70	8.10
16x12	12.60	8.70	8.40	7.80
14x10	11.10	8.40	8.10	7.50
14x 8	11.10	8.40	8.10	7.50
14x 7 to 12x6	9.30	8.10	7.50	7.50
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$8.10	$7.20	$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

(Ground Rock)

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. ton	
Barton, Fla.—Analysis, 50-65% B.P.L.	3.50@ 8.00
Centerville, Tenn.—B.P.L., 65%*	6.50*
Benotis, Fla.—Analysis 77-82% B.P.L.	8.00
Montpelier, Idaho. — Analysis, 72% B.P.L., crushed and dried	3.75
Mt. Pleasant, Tenn.—B.P.L. 65%	6.50
Twomey, Tenn.—B.P.L. 65%	6.00@ 6.50

*Less $1.00 per ton dealer commission.

Florida Soft Phosphate

(Raw Land Pebble)

	Per Ton
Benotis, Fla.—Analysis 26-28% phosphoric acid—200 lb. sacks, carload lots	10.00
Florida—F. O. B. mines, gross ton, 68/66% B.P.L.	3.25
70% min. B.P.L.	3.55
72% min. B.P.L.	3.85
Jacksonville (Fla.) District	10.00@12.00

(Ground Land Pebble)

	Per Ton
Jacksonville, Fla., District—Add 2.50 for sacks.	14.00
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65% B.P.L.	5.75

Fluorspar

Fluorspar—80% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	22.00
Fluorspar—85% and over calcium fluoride, not over 5% silica; per ton f.o.b. Illinois and Kentucky mines	23.50

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b. quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Slate granules		6.50@ 7.00
Granville, N. Y.—Red slate granules		7.50
Harrisonburg, Va.—Blk. marble (crushed, in bags)	14.50	14.50
Ingomar, Ohio (in bags)		8.00@25.00
Mertztown, Pa. (granite) bags, $10.00; bulk		8.00
Milwaukee, Wis.		14.00@26.00
Newark, N. J.—Roofing granules		7.50
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsburg, N. J.—Evergreen, bulk	8.00@10.00	8.00@10.00
Creme and royal, bulk	15.00@20.00	15.00@20.00
Poultney, Vt.—Slate granules		7.50
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.—(2000 lb.)		6.00@12.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b. cars, granite	4.50	4.50

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Carpenterville, N. J.	19.00	31.50@45.00
Easton, Pa.	16.00	40.00@60.00
Eau Claire, Wis.	15.00@20.00	25.00@40.00
Ensley, Ala. ("Slagtex")	16.00	26.00
Eugene, Ore.	25.00	35.00@70.00
Friesland, Wis.	22.00	32.00
Houston, Tex.		19.50
Omaha, Neb.	18.00	30.00@40.00
Portland, Ore. (Del'd)	21.00	30.00@60.00
Puyallup, Wash.	20.00	30.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
St. Paul, Minn.	15.00	30.00@45.00
Salem, Ore.	25.00	35.00@50.00
Salt Lake City, Utah	17.00@18.00	35.00@40.00
Springfield, Ill.	18.00	20.00@25.00
Wauwatosa, Wis.	15.00@16.00	28.00@75.00
Watertown, N. Y.	18.00@21.00	35.00@37.00
Winnipeg, Can.	18.00	26.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	15.00@16.50
Buffalo, N. Y.	16.50
Dayton, Ohio	13.50
Grand Rapids, Mich.	11.00
Lancaster, N. Y.	14.50
Michigan City, Ind.	11.00
Milwaukee, Wis. (delivered)	14.00
Minneapolis, Minn.	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Rives Junction, Mich.	12.00
Saginaw, Mich.	12.00
San Antonio, Texas	13.00
San Antonio, Texas (deliv. city lts.)	13.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	20.00
F.o.b. cars	15.00
Winnipeg, Can.	15.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	25.00	16.00
Baltimore, Md.	24.25	17.85
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	20.00
Dallas, Tex.	23.50	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	20.00	19.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	21.00	21.00
New York, N. Y.	18.20	13.10
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	.....
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bbl. and per bag net in carload lots.

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	2.60
Boston, Mass.	.....	2.53@3.03
Buffalo, N. Y.	.....	2.48
Cedar Rapids, Iowa	.59½	2.48
Cincinnati, Ohio	.60¼	2.54
Cleveland, Ohio	.60¼	2.46
Chicago, Ill.	.52½	2.00
Columbus, Ohio	.....	2.49
Dallas, Texas.	.56¼	2.25
Davenport, Iowa	.58¼	2.43
Dayton, Ohio	.....	2.48
Denver, Colo.	.....	2.84
Detroit, Mich.	.59¼	2.28
Duluth, Minn.	.54¾	2.25
Indianapolis, Ind.	.57¾	2.41
Kansas City, Mo.	.61¼	2.45
Los Angeles, Cal. (less 5c dis.)	.....	3.16
Memphis, Tenn.	.....	2.84
Milwaukee, Wis.	.56¼	2.17@2.37
Minneapolis, Minn.	.60½	2.56
Montreal, Canada (sks. 20c ext.)	.....	2.25
New Orleans, La.	.....	2.90
New York, N. Y.	.....	2.15@2.25
Philadelphia, Pa.	.....	2.41
Phoenix, Ariz.	.....	3.30
Pittsburgh, Pa.	.54¾	2.24
Portland, Ore.	.....	3.05
San Francisco, Cal.	.....	2.61
St. Louis, Mo.	.58¾	2.35
St. Paul, Minn.	.60½	2.56
Seattle, Wash. (10c bbl. dis.)	.....	2.90
Spokane, Wash.	.....	.....
Toledo, Ohio	.62	2.48

NOTE—Add 40c per bbl. for bags.

Mill prices f. o. b. in Carload Lots to Contractors

	Per Bag	Per Bbl.
Buffington, Ind.	.46¼	1.95
Cincinnati, Ohio	.....	3.00†
Concrete, Wash.	.....	2.60
Dallas, Texas	.....	2.15
Dayton, Ohio	.....	2.85†
El Paso, Tex.	.....	3.20*
Hannibal, Mo.	.....	2.10
Hudson, N. Y.	.....	2.05
Indianapolis, Ind.	.....	2.96†
Leeds, Ala.	.....	2.20
Los Angeles, Calif.	.....	2.80
Louisville, Ky.	.....	2.37
Memphis, Tenn.	.....	3.24†
Northampton, Pa.	.....	2.10
Phoenix, Ariz.	.....	4.30‡
Steelton, Minn.	.50	2.06
Universal, Pa.	.48¾	2.00

*Gross, 10c sacks and 10c per bbl. disc 10 days.
†Including cloth sacks.
‡Gross, 15c sacks and 5c per bbl. disc. 10 days

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	——Plaster Board—— ¼x32x36" Weight 1500 lb. Per M Sq. Ft.	⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ½x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	.....	6.00	6.00	.....	13.00	.....	.....	.....	.....	.....	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	10.00	.....	7.00	.....	.....	.....	20.00	.....
Grand Rapids, Mich.	3 00	.....	5.00	10.00	10.00	10.00	.....	.....	31.00	.....	19.75	20.00	30.00
Hanover, Mont.	4 50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00	.....	.....	10.00	11.00	11.50	.....	.....	33.75	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	16.40	.....	.....	.....	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Bags, 10c each; Paper Bags, $1.50 per ton extra (not returnable).
*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding $0c per ton

News of All the Industry

Incorporations

The Northeast Missouri Sand & Gravel Co. has been incorporated in Hannibal, Mo., by John Ringling, W. C. Ramsey, and others.

The Plattin Sand & Gravel Co. has been incorporated in St. Louis, Mo., with a capital stock of $50,000, by Chas. Spier, 5739 Page ave., F. J. Burkhard, 2250 Benton st., and others.

National Rock & Gravel Co., Los Angeles, Calif., $25,000.

Ales Torp. Inc., Niles Center, Ill., capital $15,000. Deal in gravel, sand, building materials. Incorporators: Magnhild Torp, John Torp, Paul Ales. Correspondent: Graham, Kessler & Thonander, suite 904, 140 N. Dearborn st., Chicago.

Sonoma Gravel Co., Santa Rosa, Calif. Capital stock $30,000.

Natural Asphalt Co. of American, Dover, Del., manufacturing of asphalts, road binders, tars, etc.; capital $450,000.

Richmond Mica Corp. has been incorporated in Richmond, Va., with a capital stock of $225,000. Whitney C. Faulkner is president and Irvin G. Craig is secretary.

Dietz Concrete Construction Co. has been incorporated in Birmingham, Ala., with a capital stock of $25,000, by J. F. Dietz, president; I. L. Paisley, secretary and treasurer, and others.

The New Egyptian Portland Cement Co., Detroit, Mich., has increased its capital stock from $1,000,000 to $2,000,000.

Northwestern Pike Lime Co., Tunnelton, Pa., $5,000; M. M. Bolyard, of Newburg; Hubert Bolyard, J. W. Bolyard, W. H. Bolyard, L. E. Bolyard, Dayton Alford and J. Wesley Shaffer of Tunnelton.

The Trinidad Concrete Products Co., H. E. Pople, P. J. Bacca and J. B. Barnard, incorporators; capitalization $50,000; seat of business, Trinidad, Colo.

Henderson Structural Units Co., Wilmington, Del.—Manufacture and sale of concrete structural units and other concrete products; capitalization $1,500,000.

American Brick and Fertilizer Corp., Pittsburgh, Pa., acquire mineral lands, $500,000.

Petersen Sand & Gravel Co., Illinois. Wisconsin agent, Ole A. Petersen, R. No. 8, Janesville; total authorized capital stock $54,680. Proportion to be used in Wisconsin $50,000.

Detroit Concrete Receptacle Co. has increased its capital stock from $100,000 to $350,000. The additional capital received to carry out the expansion program will be provided for by the sale of $250,000 of its preferred and common stock. The company will manufacture concrete products, in addition to its own specialty.

Sand and Gravel

Herman Gohsman, 30 years old, employed in the D. & M. gravel pit, near Millersburg, Mich., north of this city, was struck in the head by a flying stone during a blast, and his skull fractured, causing his death.

The Automatic Gravel Products Co., of Muscatine, Iowa, has increased its capital stock from $100,000 to $160,000.

John Hays Hammond, the well known mining engineer, is reported to have purchased a gravel mine near Scales, Calif., which has been worked for gold as well as sand and gravel.

Alabama Concrete Products Co., Selma, Ala., is to install a complete overhead cable to cost about $12,000 at the gravel plant, contemplating a daily output of between 240 and 250 cubic yards of gravel per day.

Nine and three-quarter acres of land near the county gravel and sand pit, south of Correctionville, Ia., has been leased by the Woodbury county board of supervisors from the Merchants State bank of Correctionville. The county will lease the new acreage for 20 years, paying a rental of $600 an acre.

Walter L. Taylor has purchased the interest of John H. Weddle in the Montebello Sand and Gravel Co., which he and Mr. Weddle have been operating as partners. The business will be continued as the Montebello Sand and Gravel Co., with Mr. Taylor as sole owner.

Mr. Johnson, a member of the company which bought the Guy Hale farm, at Allegan, Mich., and is shipping sand from there for foundry use, said they are at the present time shipping sand to some of the largest foundries in the state and that if the tests prove the sand to be what they think it is, he believes, the shipping of this sand from his territory will mean a great deal to the city of Allegan.

Brusky Bros. have installed new rock crushing equipment on Sonoma creek at El Verano, Calif., and have established a gravel supply business. They intend to sell locally and also to ship gravel to the outside market.

Quarries

J. W. Vorhis has been made manager of the municipal quarry and plant of Quincy, Ill.

Four men were killed in an explosion of a 50-pound box of dynamite at the Shehan Quarry Co.'s plant at Graniteville, Mo. The dead are R. H. Brown, Jack Moyer, Gib Moyer and a man named Snow. Brown is survived by his widow and three children. The others were not married. Several other workmen were shocked by the explosion.

The city of Asheville, N. C., of which Frank L. Conder is commissioner, has acquired 29 acres of land near Beaucatcher mountain and will develop a rock quarry.

B. H. Peipmeier, state engineer from Jefferson City, was here making arrangements to open a rock crushing plant, the product to be used in making the state roads of Missouri, according to the St. Joseph, Mo., Gazette.

Substantial increase in the production of stone in New Jersey last year is shown by data compiled by the State Department of Conservation and Development in conjunction with the United States Geological Survey. In 1922, 1,903,840 short tons of various kinds of stone, having a value of $2,850,557, were taken from New Jersey quarries, as compared with 1,680,940 short tons, valued at $2,634,738, in 1921.

K. A. Merriman, at Metaline Falls, Wash., from Portland, Ore., blasting expert, set off a blast for the Lehigh Portland Cement Co. Eighteen tons of powder was set off in this blast, throwing out 96,000 tons of rock.

Cement

The Union Portland Cement Co., of Salt Lake City, Utah, has brought suit to recover $60,000 paid as taxes, for which it claimed it was wrongfully assessed.

Under the Grecian custom regulations, which have recently become effective, allowing the free importation of building materials to be used in the reconstruction of the portion of the city burned in 1917, a trial order of American cement has arrived. This cement was sold by the importer at a lower price than cement prepared in Greece. If consumers are satisfied with the quality, it is possible that a permanent market will be developed, unless exchange conditions again become so unfavorable as to prohibit buying in foreign markets and materials which are produced locally.

The Dewey Portland Cement Co., of Batesville, Okla., is enlarging its plant with the addition of a new kiln. Work on the kiln has already been started, and it is expected that the construction will be finished in a short time. Another battery of concrete storage tanks is also being put up, making a total of 10 tanks, with a total capacity of 480,000 bags. About 400 men and 40 women are employed at the cement plant now.

San Antonio Portland Cement Co., of San Antonio, Tex., has let the contract for erection of three concrete stacks.

The Cement Securities Corporation, Denver, Colo., is reported to be drilling out a tract of cement rock land near Dawson, Okla., with a view to establishing a cement plant there if conditions warrant.

The cement mills in southeastern Kansas have filed an application with the public utilities commission for an adjustment of the cement rates to the western half of Kansas. The application was filed by the Iola Cement Mills traffic association on behalf of all the mills in the gas belt and by the Ash Grove Lime and Cement Co., Fredonia Portland Cement Co., Great Western Portland Cement Co., and the Monarch Portland Cement Co. The complaint asserts the interstate rates on cement from points in Missouri and Iowa to all Kansas points west of Salina and Hutchinson are so much lower than the rates from the Kansas gas belt that the Kansas mills are unable to compete successfully in this territory.

Business men of Austin, Minn., are organizing a committee to co-operate with business men of Le Roy in properly bringing to the attention of the Minnesota state-owned cement plant committee, the claims that Mower county has for providing the location for the plant in the event the legislature votes to build it.

H. M. Hadley, a structural engineer of Seattle, was sent by the association to visit Japan, for the purpose of studying and reporting on the effect of the earthquake on the many modern buildings erected in Japan within the last few years. Mr. Hadley's cable, sent soon after his arrival, indicated that modern reinforced concrete structures in the earthquake zone gave a good account of themselves, and that concrete will be used more than ever in the great rebuilding plan in Japan, which is already under way.

The delay of the state of Michigan in awarding road contracts, compelled Michigan cement manufacturers to seek outside orders early in the season, according to J. F. Lockley, of the Newaygo Portland Cement Co. He says that when the contracts were awarded the plants could not supply the cement fast enough. The season of heavy demand will close with the arrival of freezing weather, which will stop road work, but the factories will continue to operate at capacity through the winter for an early spring start. The Newaygo plant usually closes in December, but this season may run longer to increase its reserve stock.

The same level in cement rates between Oklahoma and Kansas as had previously been established between points in Kansas and points in Missouri, Nebraska and South Dakota, has been recommended by John T. Mooney, examiner, in a case reported before the interstate commerce commissioner.

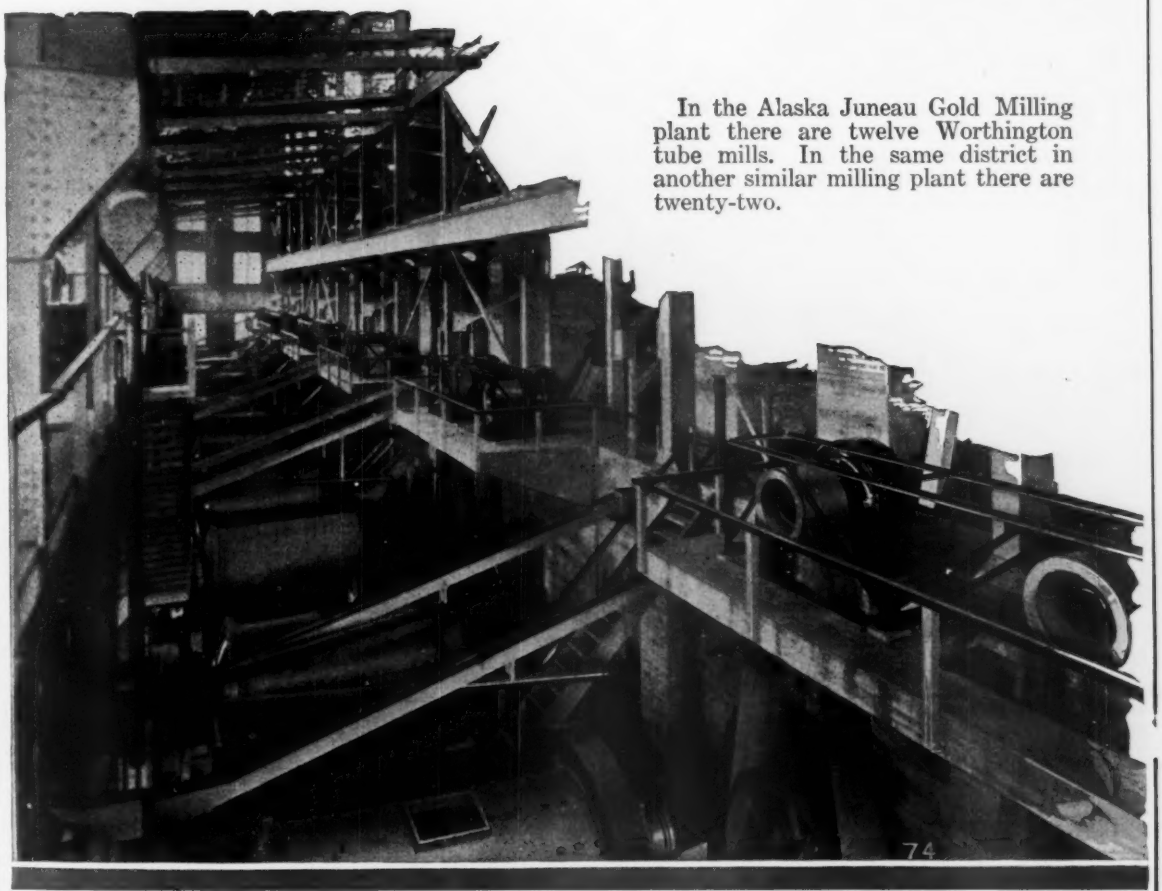
A group of cement manufacturers from England and Denmark have arrived here, and are expected to join several Englishmen, also representatives of the industry, who have been here a short time. They arrived almost simultaneously with cabled reports of an international cement consolidation in prospect, according to a New York News dispatch.

Manitowoc Portland Cement Co. has been granted its formal building permit. The estimated cost of the building is $175,000. Fees for the permit amounted to $163.50. Work on the plant has been progressing for some time but the formal issuance of the permit was held up while the plans and specifications were being approved by the state board at Madison, Wis.

San Joaquin Portland Cement Co., Three Rivers, Cal., is perfecting plans for a new cement mill with initial capacity of 3500 bbl. per day, estimated to cost $1,000,000 with machinery. A power plant and machine shop will be built. G. F. Hamburg and F. A. Parker, both officials of the Old Mission Portland Cement Co., 608 Crocker bldg., San Francisco, head the company.

International Portland Cement Co., which has a quarry about a mile south of Evans, Wash., is putting in a "coyote" hole in the mountain to enable workmen to gain access to the product, expecting to resume rock crushing and shipping some time in December. When running full blast this company employs about 20 men.

Twelve Worthington Tube Mills in This Plant



In the Alaska Juneau Gold Milling plant there are twelve Worthington tube mills. In the same district in another similar milling plant there are twenty-two.

WORTHINGTON PUMP AND MACHINERY CORPORATION

Executive Offices: 115 Broadway, New York City. Branch Offices in 24 Large Cities W-231.8

WORTHINGTON

Deane Works, *Holyoke, Mass.*
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Gas Engine Works, *Cudahy, Wis.*
Power & Mining Works *Cudahy, Wis.*
Snow-Holly Works *Buffalo, N. Y.*
Epping-Carpenter, *Pittsburgh, Pa.*

When writing advertisers please mention ROCK PRODUCTS

Silica Sand

Elizabeth Jones has brought suit against the Millwood White Sand & Products Co., and Chester Dixon, against whom she claims to hold notes that aggregate $125,000, asking foreclosure of the mortgage and appointment of a receiver for the plant. The Millwood Co. operates a glass plant in eastern Knox county.

A report of the examination of the sandstone deposits of the Clifton City and Flat Creek neighborhood, near Sedalia, Mo., has been made public by H. A. Buehler, state geologist of the Bureau of Geology and Mines, Rolla. The report made **by Mr. Pond conveys** the idea that the material is not of sufficient importance to warrant attention commercially. He recommends, however, that the deposits be drilled for further examination. The Flat Creek sandstone, he stated, was of little value as glass sand, as it was streaked with iron deposits and was too rough for fine building stone.

The Fredonia, Kansas, Window Glass plant was built about 20 years ago by C. F. Lutes and his associates, with Mr. Lutes as manager. The plant runs about 30 weeks a year and manufactures one carload of glass per day, and in so doing uses one carload of white sand, shipped from Pacific, Mo. When running the plant employs 200 skilled workmen and when idle 12 men. The payroll runs about $325,000 per year, according to the Fredonia Citizen.

Concrete Products

The Portland Cement Stone Co. began manufacturing cement blocks in 1902. This company was the first to make cement blocks in Topeka, Kansas, and the block was a curiosity here when first shown. Already this company has manufactured and sold nearly two million blocks.

George Watson, Chatsworth, Ill., has purchased ground between the street and T. P. & W. tracks, and plans to begin work on erecting thereon sand, gravel and cement storage houses of cement blocks. These buildings are to be built to enable the sand and other commodities to be unloaded from the railroad cars and again into the motor trucks with as little shoveling as possible.

John Klorer, city engineer of New Orleans, La., is interested in establishment of a concrete curb factory in that city. Plans call for a building 40x60 ft.

I. Delstein, 717 West Adams St., Jacksonville, Fla., is in the market for building block machinery.

Orlen Royce has sold his cement block and brick manufacturing business in Seaside, Ore., to Kerr Brothers and John Royce.

Marathon Concrete Works, Marathon, Wis., has been incorporated with a capital of $5000, by C. Kerstein, A. Buman and others, to manufacture and sell concrete blocks.

Concrete Products Club, of Los Angeles, Calif., held a dinner meeting on November 20.

Magnesite

The Duralite Co., Central Bldg., Seattle, Wash., recently organized to manufacture a special composition building material, formed of purified magnesite, dolomite, quartz, silica sand and other products, has plans under way for the construction of a new local plant, estimated to cost about $50,000. Harry Shaw is president.

Trade Literature

Good Roads Machinery Co. issues a very attractive catalog describing Climax crushers and elevating, conveying and screening machinery. There are some excellent photographs of complete crushing plants.

Man Power Multiplied, Booklet No. 10, has been issued in a second edition by the Brown Hoisting Machinery Co., Cleveland, O. It is very handsomely illustrated. The text is devoted to the economical handling of various materials by various types of cranes.

Friction Transmission is a 91 page book issued by the Rockwood Mfg. Co., Indianapolis, Ind., and now in its third revision. It is almost a model for literature of this kind, being full of detailed information regarding friction drives, and their application.

The Curtis Pneumatic Machinery Co. has issued a neat folder giving a history of the company, which now has 70 successful years behind it.

Stratton-Cahoon Co., 809 McIntyre Bldg., Salt Lake City, Utah, will look after the sales of the Weller Manufacturing Co., of Chicago, in the northwest territory. The Weller Mfg. Co. has supplied most of the sugar beet handling and storing machinery in the sugar districts. They have also installed the grain handling machinery in a great number of the large flour mills and terminal elevators. With their new connection they will, no doubt, be contender for a large part of the business in the northwest territory. To take care of their trade in the Omaha territory. the Weller Mfg. Co. will open a sales office at 627 Grain Exchange bldg., Omaha, Neb. Mr. O. F. Barklage, of the Industrial Sales & Engr. Co., will be in charge. Mr. Barklage is a graduate engineer and is well fitted to take care of the problems that arise in the mechanical handling of the raw materials and finished products.

Personal

Ralph C. Bird has been appointed special sales representative, to cement mills, of the Chain Belt Co., Milwaukee.

Mr. Bird has been connected with the cement industry for approximately 12 years and is widely known. For the past six years he has been associated with the Bradley Pulverizer Co. in the sale of grinding machines. As special sales representative of the Chain Belt Co. he succeeds G. O. Curtis, now connected with the International Portland Cement Corporation, New York. Through Mr. Bird and other sales representatives the Chain Belt Co. will continue to give special attention to the material handling and power transmission requirements of the cement industy. The company has developed special chains for cement mill use and also the company manufactures coal and ash handling machinery, cement elevators and conveyers, special hardened sprocket wheels, malleable buckets and power transmission equipment under the trade-name "Rex." It aso makes concrete mixers.

Alfred Courchesne, for 38 years a resident of El Paso, has celebrated his 75th birthday anniversary. Mr. Courchesne came to El Paso in 1885 and a year later established the El Paso Lime Stone quarries, of which he has been the head ever since. During his residence there Mr. Courchesne has been known as one of the most beloved residents of both city and county. He has served as county commissioner, as president of the Chamber of Commerce, president of the Smeilter School Board, and for 25 years as director of the public library. Mr. Courchesne is prominent in Masonic circles, having received the 33d degree. Members of his immediate family honored Mr. Courchesne's birthday with a dinner party at their home at Courchesne Thursday evening.

Mr. F. A. Klopp, a graduate engineer, is the new representative of the Weller Mfg. Co., Chicago, and will be located at 1401 Lexington building, Baltimore, Md. He has the experience in material handling equipment, as prior to his connection with the above company he has represented and sold elevating and conveying machinery for several firms in the Southeastern territory.

E. B. Nichols, formerly with the Lake Shore Stone Products Co., Sandusky, Ohio, has accepted the position of quarry superintendent of the Tidewater Portland Cement Co., Union Bridge, Md.

Gypsum

H. J. Martin is erecting a gypsum tile factory at 355 Bickett street in the industrial section known as Huntington Park, Los Angeles, Calif. The output will be one carload every 24 hours. A. J. Bruce of Los Angeles is associated with Mr. Martin.

Trade Notes

Cochise Machine Co. has changed its name to Cochise Rock Drill Mfg. Co.

The Bertha-Consumers Co. of Pittsburgh, Pa., at a cost of $500,000 has completed installation of shaker screens, picking tables and loading booms on the tipples of all its mines, together with storage battery locomotives for gathering purposes. John H. Jones, president of the company, accompanied by his son, Marshall J. H. Jones, has just returned from an inspection tour of the properties. Mr. Jones is very optimistic concerning future business conditions and looks for continued prosperity during 1924.

Lime Salts in Bread

PATENTS have been issued recently to a prominent baking company for: "A white leavened bread having its texture, lightness and flavor comparable with modern bread made from bolted white wheat flour, said bread containing 10-12 per cent solids of whole milk, 5 per cent of a preparation rich in water-soluble vitamine B, 3 per cent of oleo oil and ½-1 per cent of innocuous calcium salts, all calculated on the weight of the flour."

Lime salts—carbonate, hydrate and phosphate—have long been used as ingredients of patented stock food. At last we see them recognized in the human diet.

Lime and Lime Cement Brick Mortar

THE most recent publication of the National Lime Association is bulletin No. 300-A, "Lime and Lime-Cement Brick Mortar."

This bulletin was prepared in response to repeated requests from engineers, architects and contractors who wanted a short and easily read, but accurate summary, of the properties of lime in mortar. The essential features of mortar in the wall, cohesive, adhesive and compressive strength, watertightness and economy are discussed clearly and conclusively.

This bulletin will be sent on request, by the National Lime Association, Washington, D. C.

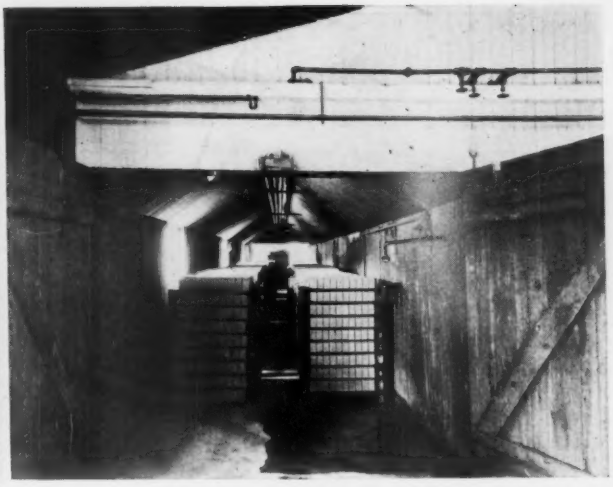
University of Michigan Offers Short Courses in Highway Engineering

THE University of Michigan is offering short courses in highway engineering and highway transport to graduates of engineering schools. These courses lead to the degree of Master of Science or Master of Science in Engineering. They are given in periods of two weeks each during the months from December to March inclusive.

New Cement Plant for British Columbia

A CEMENT industry is to be established at Popeum, 10 miles from Chilliwack, B. C., by a recently organized company known as the Mainland Portland Cement Co. The company has secured the Hart & Damask property, which is rich in marle, and it is reported that work on the plant, representing an investment of about $1,000,000, will commence shortly.—*Victoria, B. C., Colonist.*

In the foreground, delivering mix to presses by wheelbarrow. Pneumatic tired off bearing truck delivering empty pallets to operators



One of the three 8x50-ft. kilns or curing rooms. The brick are cured by steam delivered in a perforated pipe lying in a water trough

QUALITY
BEAUTY
UTILITY

IMPERVIOUS
FIRE
RESISTING

SHOPE BRICK

The engravings shown here are interior views of the successful Shope Concrete Brick plant which is owned and operated by the Warren Sand and Gravel Co., Easton, Pa., in conjunction with a large sand and gravel business.

The manufacture of Shope Concrete Brick in the larger sand and gravel plants is becoming more and more common.

This manufacture of Shope Concrete Brick affords the producer of sand and gravel a considerable outlet for sand that frequently is a waste product and at the same time he is building a permanent business that pays handsome dividends. Where others succeed you can.

Write for Complete Information

SHOPE BRICK COMPANY

PORTLAND, OREGON

Platform where batch mix is prepared for brick. Sand hopper is overhead the mixer. Cement is delivered from main loading track by chain elevator

Brick machine where both Shope common and face brick is made. The close-up shows operators striking off surplus material

Buyers' Directory
of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

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Denver Rock Drill Mfg. Co., Denver, Colo.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Worthington Pump & Mchy. Corp., New York, N. Y.

Air Separators
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
R. M. Gay Co., Inc., New York, N. Y.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mchy. Co., Kingston, N. Y.

Automatic Weighers
Merrick Scale Mfg. Co., Passaic, N. J.
Richardson Scale Co., Passaic, N. J.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Babbitt Metal
Ajax Metal Co., Philadelphia, Pa.
Lewistown Fdy. & Machine Co., Lewistown, Pa.

Bags and Bagging Machinery
Jaite Co., Jaite, Ohio

Balls (Tube Mill, etc.)
Hardinge Co., New York, N. Y.
Worthington Pump & Mchy. Corp., New York, N. Y.

Belt Fasteners and Hooks
Crescent Belt Fastener Co., New York City

Belt Lacing and Rivets
Crescent Belt Fastener Co., New York City

Bins and Bin Gates
Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Mchy. Co., Cleveland, Ohio
Easton Car and Construction Co., Easton, Pa.
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Weller Mfg. Co., Chicago, Ill.

Blasting Powder
Grasselli Powder Co., Cleveland, Ohio

Boiler Insulation
Celite Products Co., Chicago, Ill.

Boilers (Water Tube)
Jackson & Church Co., Saginaw, Mich.

Box Car Loaders
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Brick Machinery
Jackson & Church Co., Saginaw, Mich.
Shope Brick Co., Portland, Ore.

Buckets (Elevator and Conveyor)
American Manganese Steel Co., Chicago Heights, Ill.
Brown Hoisting Mchy. Co., Cleveland, Ohio
Hendrick Mfg. Co., Carbondale, Pa.
Jeffrey Mfg. Co., Columbus, Ohio
Lewistown Fdy. & Machine Co., Lewistown, Pa.
Smith Engineering Works, Milwaukee, Wis.
Taylor Wharton Iron & Steel Co., High Bridge, N. J.
W. Toepfer & Sons Co., Milwaukee, Wis.
Weller Mfg. Co., Chicago, Ill.

Buckets (Grab, Clambshell, etc.)
Brown Hoisting Mchy. Co., Cleveland, Ohio
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, Ohio
Orton & Steinbrenner Co., Chicago, Ill.

Burr Mills
Butterworth & Lowe, Grand Rapids, Mich.
Munson Mill Machinery Co., Utica, N. Y.

Cableways
Interstate Equipment Corp., New York, N. Y.

Calcining Kettles (Gypsum)
American Process Co., New York, N. Y.
Butterworth & Lowe, Grand Rapids, Mich.

Car Movers
Atlas Railway Supply Co., Chicago, Ill.

Car Pullers
Ottumwa Box Car Loader Co., Ottumwa, Iowa
Thomas Elevator Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Cars (Quarry)
Atlas Car & Mfg. Co., Cleveland, Ohio
Easton Car and Construction Co., Easton, Pa.
United Iron Works, Inc., Kansas City, Mo.

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Carroll Chain Co., Columbus, Ohio

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Dodge Mfg. Corp., Mishawaka, Ind.
Link-Belt Co., Chicago, Ill.

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Knox Mfg. Co., Philadelphia, Pa.

Clutches
Dodge Mfg. Corp., Mishawaka, Ind.
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Allis-Chalmers Mfg. Co., Milwaukee, Wis.
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K-B Pulverizer Co., Inc., New York City
Pennsylvania Crusher Co., Philadelphia, Pa.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.

Colors (Cement and Mortar)
C. K. Williams & Co., Easton, Pa.

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Dodge Mfg. Corp., Mishawaka, Ind.
Jeffrey Mfg. Co., Columbus, Ohio
Kennedy-Van Saun Mfg. & Eng. Corp., New York City
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Smith Engineering Works, Milwaukee, Wis.
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W. Toepfer & Sons Co., Milwaukee, Wis.
United Iron Works, Inc., Kansas City, Mo.
Universal Crusher Co., Cedar Rapids, Iowa
Universal Road Mchy. Co., Kingston, N. Y.
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.

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Byers Machine Co., Ravenna, Ohio
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Industrial Works, Bay City, Mich.
Koehring Co., Milwaukee, Wis.
Link-Belt Co., Chicago, Ill.
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio

Cranes (Locomotive)
American Hoist & Derrick Co., St. Paul, Minn.
Brown Hoisting Mchy. Co., Cleveland, Ohio
Byers Machine Co., Ravenna, Ohio
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Link-Belt Co., Chicago, Ill.
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, Ohio
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., Marion, Ohio

Cranes (Overhead Electric Traveling)
Morgan Engineering Co., Alliance, Ohio

Crushers (Hammer)
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R. M. Gay Co., Inc., New York, N. Y.
Hardinge Co., New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City
Lewistown Fdy. & Machine Co., Lewistown, Pa. (Jaw)
Morgan Engineering Co., Alliance, Ohio
New Holland Machine Co., New Holland, Pa.
Smith Engineering Works, Milwaukee, Wis.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
United Iron Works, Inc., Kansas City, Mo. (Jaw)
Universal Crusher Co., Cedar Rapids, Iowa
Universal Road Mchy. Co., Kingston, N. Y.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo. (Jaw)
Worthington Pump & Mchy. Corp., New York, N. Y.

Crusher Protectors
Dings Magnetic Separator Co., Milwaukee, Wis.

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United Iron Works, Inc., Kansas City, Mo.
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Derricks
McMyler Interstate Co., Cleveland, Ohio
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Koehring Co., Milwaukee, Wis.
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
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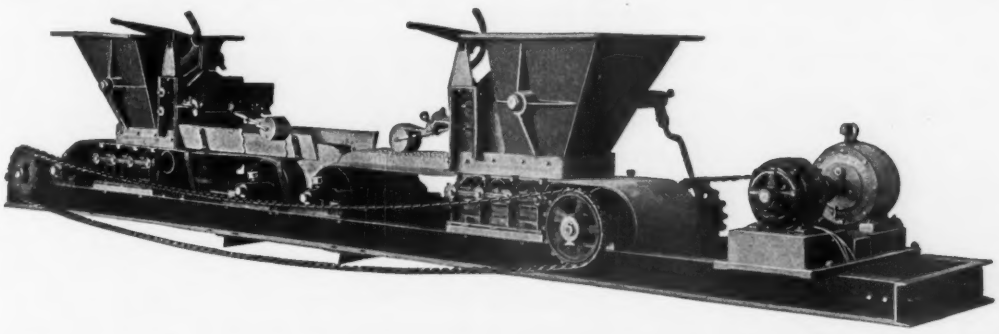
Morris Machine Works, Baldwinsville, N. Y.



CHURCH PATENTED VOLUMETER

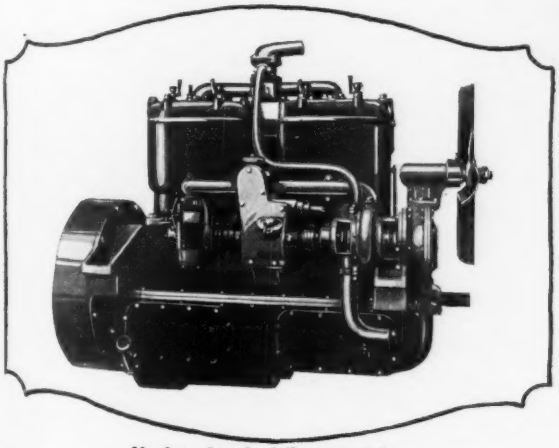
The Church Volumeter, for the proportioning of sand and lime for making sand lime brick, used in connection with the Jackson and Church Rod Mill, is so designed that it will measure exactly, within a very small per cent of error, the correct amounts of lime and sand as previously desired.

This machine is automatic in operation, as it only requires the occasional attention of the oiler.

JACKSON & CHURCH
SAND LIME BRICK MACHINERY *company* SAGINAW, MICH. U. S. A.

10 Cents a Month

Total Repair Cost in 18 Months of Continual Operation



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Orton & Steinbrenner, Huntington, Ind., and others.

Orton & Steinbrenner Dragline Excavator Operating on Sewer Contract

Whitney Brothers, Detroit, Mich., write us:

"One of your type TU engines has been operating on an Orton & Steinbrenner dragline continually for eighteen months on sewer contract. This, as you know, is the hardest kind of work that an engine can be put to.

"The total amount of repairs that have been purchased for that engine, to date, consists of one cylinder head gasket."

Be sure your new equipment is powered with

CLIMAX

"The Trustworthy Engine"

You will not only avoid costly repair bills, but the even greater losses due to idle machines and interrupted operations.

Write for Catalog

CLIMAX ENGINEERING COMPANY
22 West 18th Avenue **Clinton, Iowa**

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of the Rock Products Industry

Classified Directory of Advertisers in this issue of Rock Products

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Fuses (Detonating and Safety)
Grasselli Powder Co., Cleveland, Ohio

Gas Producers
Morgan Construction Co., Worcester, Mass.
R. D. Wood & Co., Philadelphia, Pa.

Gears (Spur, Helical, Worm)
Taylor Wharton Iron & Steel Co., High Bridge, N. J.

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Austin Mfg. Co., Chicago, Ill.
Robins Conveying Belt Co., New York City
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.

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Hyman-Michaels Co., Chicago, Ill.
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Jackson & Church Co., Saginaw, Mich.
S. Flory Mfg. Co., Bangor, Pa.
Thomas Elevator Co., Chicago, Ill.
United Iron Works, Inc., Kansas City, Mo.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

Hose Menders
Knox Mfg. Co., Philadelphia, Pa.

Hydrators (Lime)
Kritzer Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
H. Miscampbell, Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Insulation (Heat)
Celite Products Co., Chicago, Ill.

Kilns (Rotary)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City
McGann Mfg. Co., York, Pa.
H. Miscampbell, Duluth, Minn.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

Kilns (Shaft)
McGann Mfg. Co., Inc., York, Pa.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Lime Handling Equipment
Kritzer Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
H. Miscampbell, Duluth, Minn.
Raymond Bros., Impact Pulv. Co., Chicago, Ill.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.
Sturtevant Mill Co., Boston, Mass.

Loaders and Unloaders
Brown Hoisting Mchy. Co., Cleveland, Ohio
Jeffrey Mfg. Co., Columbus, Ohio
Link-Belt Co., Chicago, Ill.
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Locomotives (Steam, Gas, and Electric)
Baldwin Loco. Wks., Philadelphia, Pa. (Steam)
Davenport Loco. Wks., Davenport, Iowa (Steam and Gas)
Fate-Root-Heath Co., Plymouth, Ohio (Gas)
Ironton Eng. Co., Ironton, Ohio (Electric)
Jeffrey Mfg. Co., Columbus, Ohio (Electric)
Lima Locomotive Works, Lima, Ohio (Steam)
Milwaukee Loco. Mfg. Co., Milwaukee, Wis. (Gas)
Vulcan Iron Works, Wilkes-Barre, Pa. (Steam)

Lubricating Systems
Ottumwa Box Car Loader Co., Ottumwa, Iowa

Magnetic Pulleys
Dings Magnetic Separator Co., Milwaukee, Wis.

Magnets
Dings Magnetic Separator Co., Milwaukee, Wis.

Manganese Steel (Castings, Repair Parts, etc.)
American Manganese Steel Co., Chicago Heights, Ill.
Taylor Wharton Iron & Steel Co., High Bridge, N. J.

Mills, Grinding (Ball, Tube, etc.)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bradley Pulverizer Co., Allentown, Pa.
Hardinge Co., New York, N. Y.
Jackson & Church Co., Saginaw, Mich.
Lewistown Fdy. & Machine Co., Lewistown, Pa
Mine & Smelter Supply Co., Denver, Colo.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Worthington Pump & Mchy. Corp., New York, N. Y.

Motors and Generators (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Nipples
Knox Mfg. Co., Philadelphia, Pa.

Nozzles
Knox Mfg. Co., Philadelphia, Pa.

Perforated Metal
Cross Engineering Co., Carbondale, Pa.
Harrington & King Perforating Co., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
W. Toepfer & Sons Co., Milwaukee, Wis.

Pipe (Dredge, etc.)
R. D. Wood & Co., Philadelphia, Pa.

Portable Conveyors
Austin-Western Rd. Mchy Co., Chicago, Ill.
Jeffrey Mfg. Co., Columbus, Ohio

Portable Engines
Climax Engineering Co., Clinton, Iowa

Power Units
Climax Engineering Co., Clinton, Iowa

Pulleys
The Hill Clutch Co., Cleveland, Ohio

Pulleys (Magnetic)
C. G. Buchanan Co., New York, N. Y.
Dings Magnetic Separator Co., Milwaukee, Wis.

Pulverizers
Bradley Pulverizer Co., Allentown, Pa.
Fuller-Lehigh Co., Fullerton, Pa.
Hardinge Co., New York, N. Y.
Jeffrey Mfg. Co., Columbus, Ohio
K-B Pulverizer Co., Inc., New York City
Kent Mill Co., Brooklyn, N. Y.
Mine & Smelter Supply Co., Denver, Colo.
Munson Mill Machinery Co., Utica, N. Y.
Raymond Bros. Impact Pulv. Co., Chicago, Ill.
Universal Crusher Co., Cedar Rapids, Iowa
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Manganese Steel Co., Chicago Heights, Ill.
Morris Machine Works, Baldwinsville, N. Y.

Pumps (Water, etc.)
Emerson Pump and Valve Co., Alexandria, Va.
Morris Machine Works, Baldwinsville, N. Y.
Pennsylvania Pump and Compressor Co., Easton, Pa.
Webb City & Carterville Fdy. & Mch. Works, Webb City, Mo.
Worthington Pump & Mchy. Corp., New York, N. Y.

Rails
Easton Car and Construction Co., Easton, Pa.

Railway Supplies
Atlas Railway Supply Co., Chicago, Ill.

Road Machinery
Acme Road Mchy. Co., Frankfort, N. Y.
Austin-Western Rd. Mchy. Co., Chicago, Ill.
Brown Hoisting Mchy. Co., Cleveland, Ohio
Koehring Co., Milwaukee, Wis.
Northwest Engineering Co., Chicago, Ill.
Universal Road Mchy. Co., Kingston, N. Y.

Rock Drills
Denver Rock Drill Mfg. Co., Denver, Colo.

Rod Mills
Mine & Smelter Supply Co., Denver, Colo.

Scales (See Weighing Equipment)

Scrapers (Drag, etc.)
Austin-Western Rd. Mchy. Co., Chicago, Ill.
Northwest Eng. Co., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.

Screens
Acme Road Mchy. Co., Frankfort, N. Y.
Austin-Western Rd. Mchy. Co., Chicago, Ill.
Cleveland Wire Cloth Co., Cleveland, Ohio
Cross Engineering Co., Carbondale, Pa.
Dodge Mfg. Corp., Mishawaka, Ind.
R. M. Gay Co., Inc., New York, N. Y.
Harrington & King Perforating Co., Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City
Kent Mill Co., Brooklyn, N. Y.
Link-Belt Co., Chicago, Ill.
McLanahan Stone Machine Co., Hollidaysburg, Pa.
Robins Conveying Belt Co., New York City
Smith Engineering Wks., Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.
Traylor Eng. & Mfg. Co., Allentown, Pa.
W. S. Tyler Co., Cleveland, Ohio
United Iron Works, Inc., Kansas City, Mo.
Universal Crusher Co., Cedar Rapids, Iowa
Weller Mfg. Co., Chicago, Ill.
Williams Pat. Crush. & Pulv. Co., St. Louis, Mo.

Screens (Electric Vibrating)
W. S. Tyler Co., Cleveland, Ohio

Separators (Magnetic)
C. G. Buchanan Co., New York, N. Y.
Dings Magnetic Separator Co., Milwaukee, Wis.

Shafting
The Hill Clutch Co., Cleveland, Ohio

Sharpening Machines
Denver Rock Drill Mfg. Co., Denver, Colo.

Shovels (Steam, Gas and Electric)
Bucyrus Co., S. Milwaukee, Wis.
Erie Steam Shovel Co., Erie, Pa.
Koehring Co., Milwaukee, Wis.
McMyler Interstate Co., Cleveland, Ohio
Northwest Engineering Co., Chicago, Ill.
Orton & Steinbrenner Co., Chicago, Ill.
Osgood Co., Marion, Ohio

Sprockets and Chain
American Manganese Steel Co., Chicago Heights, Ill.
Dodge Mfg. Corp., Mishawaka, Ind.
Jeffrey Mfg. Co., Columbus, Ohio
Taylor Wharton Iron & Steel Co., High Bridge, N. J.

Steel Plate Construction
Hendrick Mfg. Co., Carbondale, Pa.
Jackson & Church Co., Saginaw, Mich.

Testing Sieves and Shakers
W. S. Tyler Co., Cleveland, Ohio

Track Equipment
Easton Car and Construction Co., Easton, Pa.

Tramways (Aerial Wire Rope)
Interstate Equipment Corp., New York City.
A. Leschen & Sons Rope Co., St. Louis, Mo.

Transmission Machinery
Dodge Mfg. Corp., Mishawaka, Ind.
The Hill Clutch Co., Cleveland, Ohio
Kritzer Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

Valves (Throttle)
Emerson Pump and Valve Co., Alexandria, Va.
Knox Mfg. Co., Philadelphia, Pa.

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Lewistown Fdy. & Machine Co., Lewistown, Pa.
Link-Belt Co., Chicago, Ill.
McLanahan Stone Machine Co., Hollidaysburg, Pa.
Smith Engineering Works, Milwaukee, Wis.
W. Toepfer & Sons Co., Milwaukee, Wis.

Weighing Equipment
Merrick Scale Mfg. Co., Passaic, N. J.
Richardson Scale Co., Passaic, N. J.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

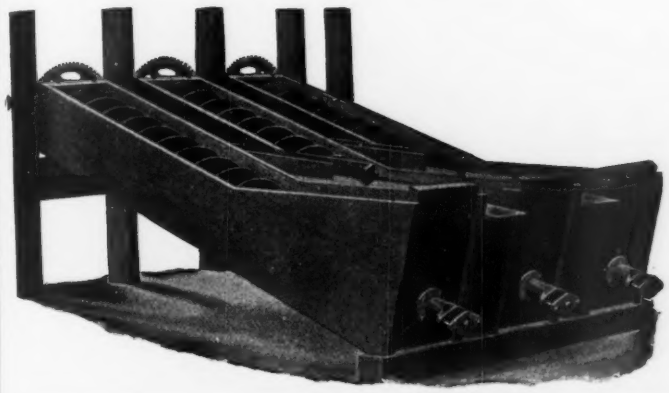
Wheels (Car)
Easton Car and Construction Co., Easton, Pa.
Taylor Wharton Iron & Steel Co., High Bridge, N. J.

Wire Cloth
Cleveland Wire Cloth Co., Cleveland, Ohio
W. S. Tyler Co., Cleveland, Ohio

Wire Rope
American Steel & Wire Co., Chicago, Ill.
Armstrong Mfg. Co., Waterloo, Iowa
A. Leschen & Sons Co., St. Louis, Mo.
Williamsport Wire Rope Co., Williamsport, Pa.

Mr. Sand Man!

IF it's clean sand you want to produce and you are unable to do so, write to us and state your trouble and we can help you to solve your problem. We make machinery that produces the cleanest Glass Sand.



The Lewistown Equipment, which includes Crushing, Grinding, Screening, Washing, Drying and Conveying Machinery, will produce more and a better quality of Glass Sand, at a bigger profit than any other equipment on the market.

LEWISTOWN FOUNDRY & MACHINE COMPANY
Lewistown, Pa.

Guaranteed Haulage

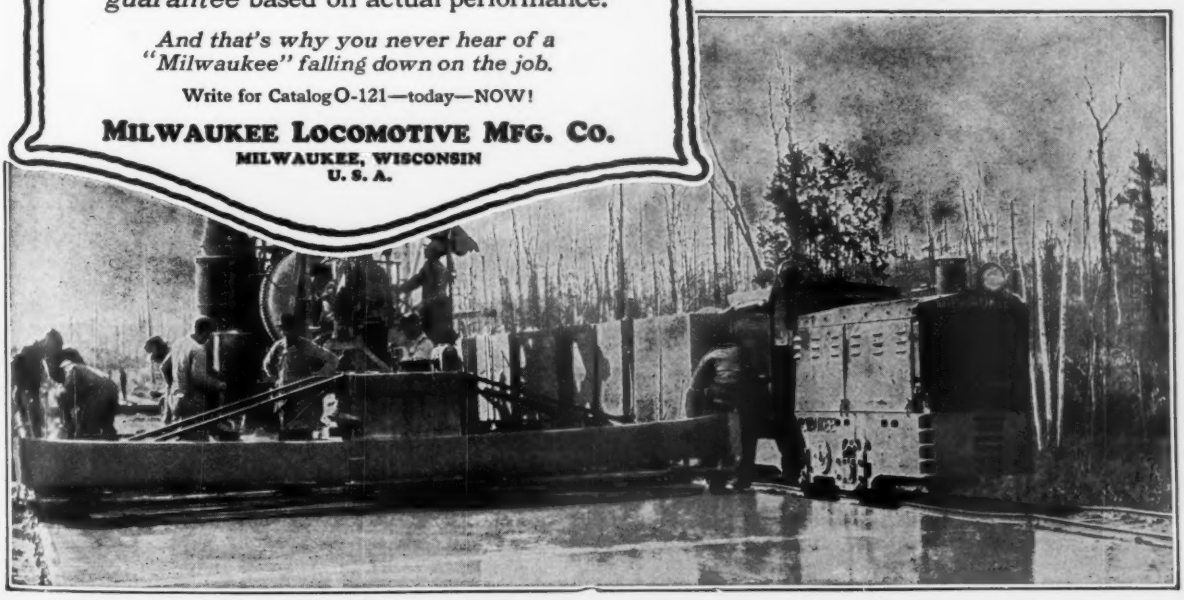
Telling the world about the good qualities, the reliability and economy of Milwaukee Locomotives would mean nothing—if we didn't back up our claims with a *positive guarantee* based on actual performance.

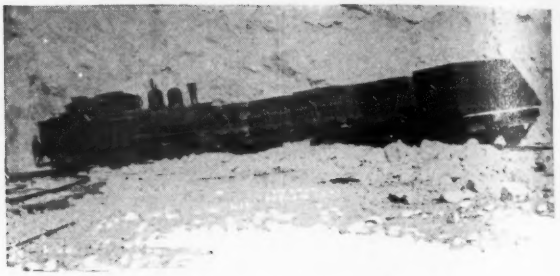
And that's why you never hear of a "Milwaukee" falling down on the job.

Write for Catalog O-121—today—NOW!

MILWAUKEE LOCOMOTIVE MFG. CO.
MILWAUKEE, WISCONSIN
U. S. A.

MILWAUKEE GASOLINE LOCOMOTIVES





Fifteen Years In Severe Service

"They are doing their work as well as a new machine, although they have been in service since 1908."

Quarry work requires Shays. Rough track and sharp curves, that derail rod engines, are very easy for Shays. Spotting with Shays saves 11 per cent in time.

Superior design and construction is keeping Shays in service for years. Let us explain these details to you.

LIMA LOCOMOTIVE WORKS, Incorporated
Lima, Ohio, 17 East 42nd St., New York

LIMA *Shay Geared* LOCOMOTIVES

VULCAN

Locomotives

A 9" x 14" 14½ ton 36" gauge locomotive with steam brake, link and pin couplers. Shipped to the Warren Sand and Gravel Co., Inc., Easton, Pa.

In thousands of quarries and industrial plants throughout the country, Vulcan Locomotives have thoroughly demonstrated their ability to deliver a service performance far in excess of any claim we have ever made.

VULCAN IRON WORKS
Est. 1849

1753 Main Street **Wilkes-Barre, Pa.**

NEW YORK OFFICE
50 Church St.

CHICAGO OFFICE
McCormick Bldg.

Malleable Hose Nozzles

Keep Expenses Down

Sizes—1½", 2", 2½" by 12" long

Furnished with
Iron Pipe, Chicago or New York Thread

Suction Hose Couplings

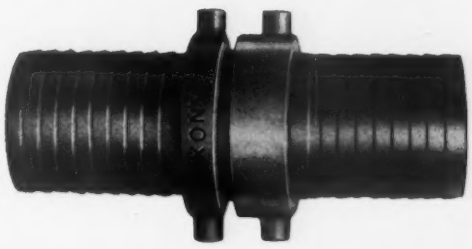
Malleable Iron with Brass or Malleable Iron Collar

Sizes—3" and 4"

Write for Catalogue No. 11 and Discounts

KNOX
Valves-Couplings-Nipples-Clamps-Menders

821 Cherry St., Philadelphia, Pa.



The Annual Review and Directory Number

December 29th Issue of ROCK PRODUCTS

The Annual Review and Directory Number has proven its value and convenience. It is an efficient and economical medium reaching a buying power of sufficient volume to make your advertising an immediate sales factor, and a tremendous aid in the building of a permanent consuming market.

Regular Space Rates are in effect for this number.

Send your Space Reservation in now.

Forms Close December 17

Rock Products

542 South Dearborn Street

Member A. B. C. **Chicago, Ill.** **Member A. B. P.**

WELLER-MADE EQUIPMENT

For Handling the Materials Mechanically

Increase the Output and Reduce Costs by Employing Weller-Made Machinery to Do the Work

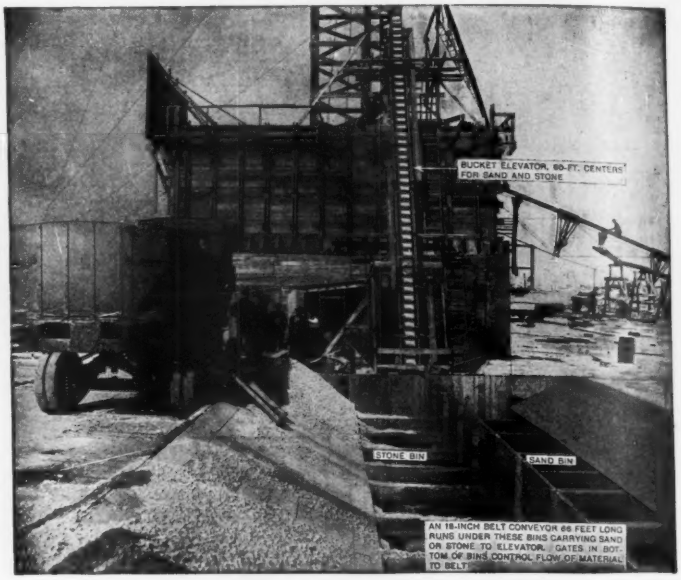
It is sturdy and reliable. Never lays down on the job. The cost of operation is small. Will help pay dividends.

We Make
Conveyors of All Types

Bucket Elevators	**Portable Elevators**
Steel Storage Bins	**Bin Gates**
Screens	**Sheet Metalwork, etc.**

WELLER MADE CHICAGO

Write and let us know the kind of equipment you are interested in or the material you want to handle. Catalogues showing installations, also data to help in selection of equipment, will be sent.


BUCKET ELEVATOR, 60-FT. CENTERS FOR SAND AND STONE
STONE BIN
SAND BIN
AN 18-INCH BELT CONVEYOR 66 FEET LONG RUNS UNDER THESE BINS CARRYING SAND OR STONE TO ELEVATOR. GATES IN BOTTOM OF BINS CONTROL FLOW OF MATERIAL TO BELT

WELLER MFG. CO.

1820-1856 North Kostner Avenue — **Chicago, Illinois**

SALES OFFICES

New York **Boston** **Baltimore** **Pittsburgh** **Cleveland** **San Francisco** **Salt Lake City**

THOMAS HOISTS

Steam and Electric—Single and Two Speed Types

For

Dragline Cableways

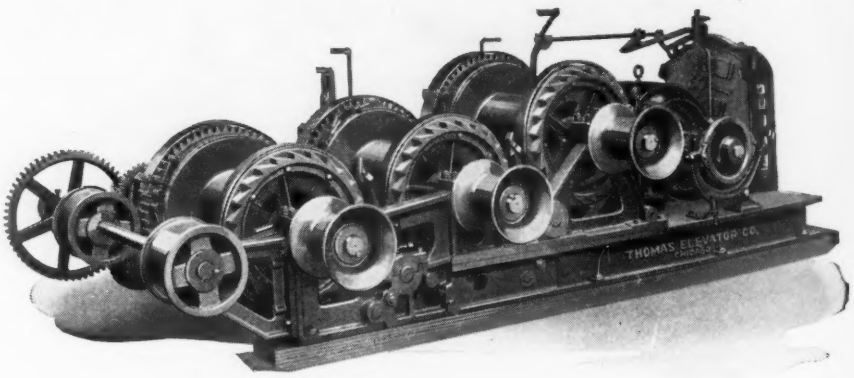
Drag Scrapers

Derricks

Bucket Operation

Car Haulage

Builders of Hoists for Over Thirty Years



Ask for Bulletin No. 4

THOMAS ELEVATOR COMPANY

27 South Hoyne Avenue — **Chicago, Illinois**

Heavy Duty Moto-Vibro Screen

FOR
SAND, GRAVEL,
CRUSHED STONE,
ETC.

Coarse or Fine
1 to 3 Products

WET, DRY, DAMP
(within reasonable limits)

ASTONISHING
CAPACITIES

ACCURATE
OUTPUTS

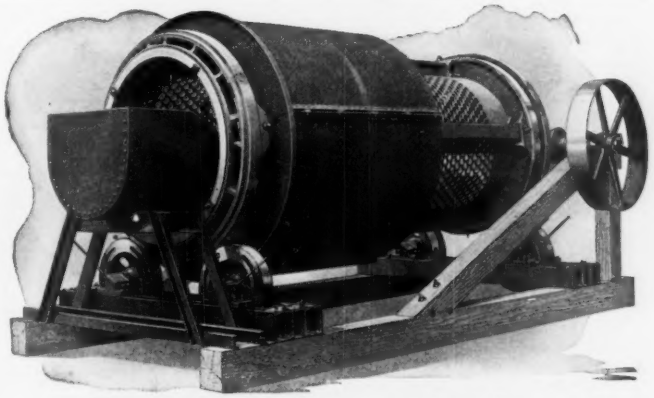
INEXPENSIVE

SCREEN FRAMES CHANGED IN 5 MINUTES—NO SPECIAL CLOTH

Intense vibration separates adhering sand from pebbles, breaks up sand "mats," prevents building on wire, wedging, and keeps meshes open.

Motor or belt driven, no auxiliaries. Simple, durable, accessible.

STURTEVANT MILL CO. HARRISON SQUARE Boston, Mass.



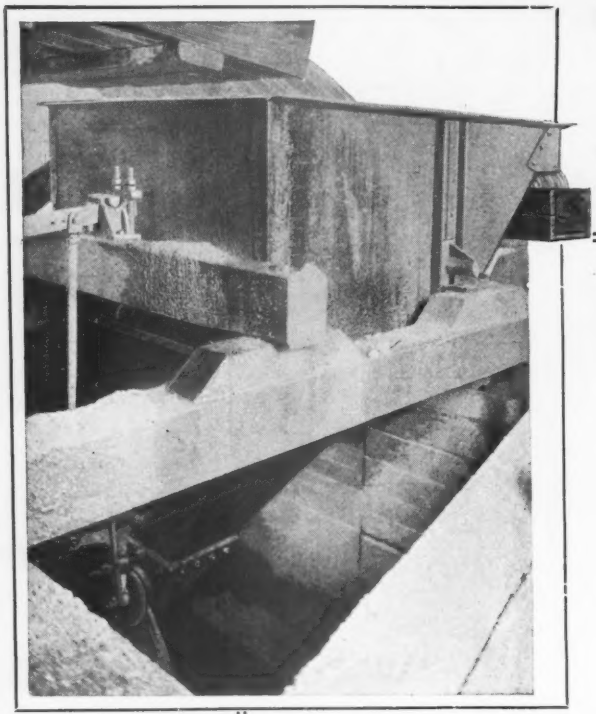
Screening Equipment

To meet the requirements of modern rock crushing plant operators, Allis-Chalmers have designed and successfully installed their Style "B" Open End Revolving Screens.

You will find the same rugged construction which characterizes all of Allis-Chalmers products thru a half century of experience. Allis-Chalmers screens will win for you in the long run. A complete line of screens, including the "Allis-Chalmers Compensated Type Shaking Screens."

Let our engineers figure on your requirements
Write for estimates

ALLIS-CHALMERS MANUFACTURING CO.
MILWAUKEE, WIS. U.S.A.



TELSMITH

A SAND TANK THAT IS *REALLY* AUTOMATIC

All sand tanks work automatically SOMETIMES; but Telsmith is the only tank that will work all day and every day, discharging a uniformly de-watered product from seven A. M. until quitting time, without even inspection. Other tanks slip occasionally, discharging the entire contents, dirty water and all, into the bins. Telsmith's short, snappy, duplex valve movement never permits that. The discharge is in small quantities but practically continuous. A deep sand bed protects your storage bins against sudden gushes of dirty water. If you have sand tank troubles, this is the way out. Glad to send you Bulletin No. G-P-11. No obligation.

SMITH ENGINEERING WORKS
3188 Locust Street Milwaukee, Wis.

CARROLL

"CARROLL" SOLID WELD CHAINS

Confidence is one of the constructive forces in industry. It is established in the mind as a result of satisfactory experiences.

"Carroll" Solid Weld Chains have earned the confidence of every user. Why? Because they are not ordinary chains and their mission is to make power shovel operation effective to the limit of production. They thrive on hard service where others falter or fail miserably. Try them! You will not regret it.

The Carroll Chain Company, Columbus, Ohio

CARROLL

CARROLL

CARROLL

PRIMM OIL ENGINES

Just A Suggestion

Find out all about the PRIMM before you buy any power unit.

The PRIMM Oil Engine has behind it the experience of twenty years oil engine building. It is built in sizes ranging from 20 to 300 H.P. to meet all requirements. It is automatic in operation--anyone can run it--and it burns the most economical of fuels.

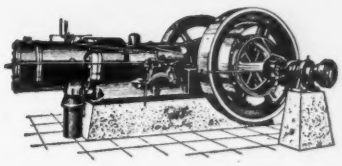
We suggest that you ask us for complete information.

The Power Mfg. Co.

705 Cheney Ave.

Marion, Ohio

¶ *PRIMM Oil Engines are built in sizes ranging from 20 to 300 H.P.*



No Labor Problem!

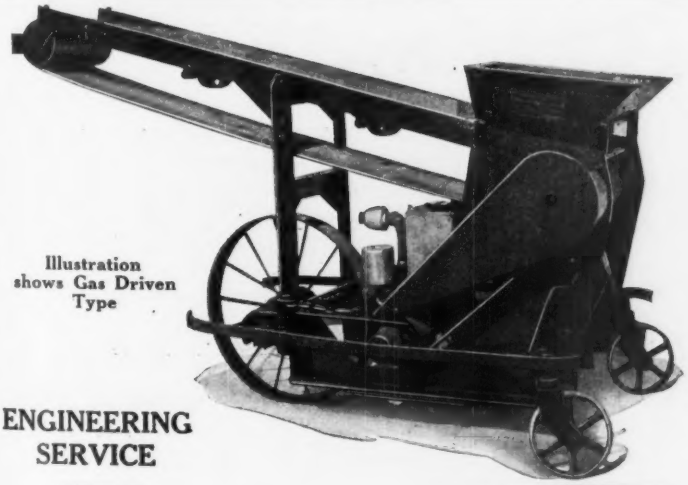


Illustration shows Gas Driven Type

Labor is scarce and men are hard to get. Wages for common labor has become almost prohibitive, and the present shortage is here to stay as it is unlikely the present immigration restrictions will ever be wholly relaxed.

The Ottumwa Box Car Loader will help solve the problem. Its use will dispense with the loading gang, as it will load cars with but part time of one man.

It is a handy, portable belt loader. It is mechanically correct and is provided with ball and roller bearings, an improved Alemite Greasing System and a novel raising and lowering device. Protected from dust and dirt and is fool proof.

Backed by 25 Years' Loading Experience

ENGINEERING SERVICE *FREE*

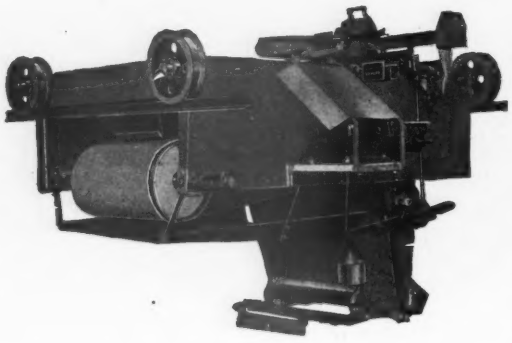
MANUFACTURERS

OTTUMWA BOX CAR LOADER COMPANY OTTUMWA IOWA.

BEST BOX CAR LOADERS AND UNLOADERS

Maintain an Accurate Check on Your Materials

The only safe method of doing this is by weighing the materials at strategic points in the line of manufacture.



A Richardson Apron Feed Automatic Scale

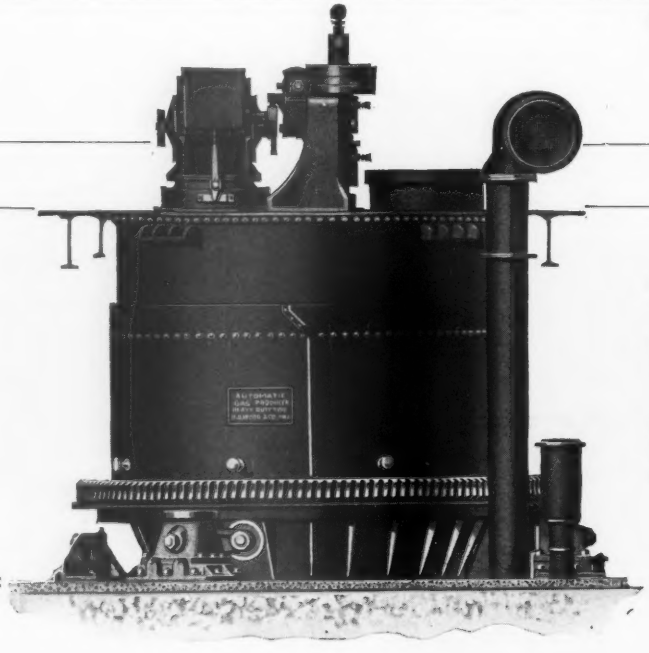
will give you accurate weights

THIS SCALE IS SUITABLE FOR LIMESTONE, MARL, SAND, GYPSUM, CLINKER, CRUSHED ROCK, COAL, and similar materials.

Investigate it and learn where it can be used in your plant.

RICHARDSON SCALE COMPANY, Passaic, New Jersey

New York Boston Chicago San Francisco



WOOD AUTOMATIC GAS PRODUCERS

What do you expect?

What do you expect of your gas producers?

Isn't it worth your while to investigate a make that will undoubtedly give you more for your investment than you are getting?

R. D. Wood and Company's Automatic Gas Producers operate with unusually low labor and maintenance costs and special features effect exceptional efficiencies.

Used in Leading Lime Plants

Our Catalog Will Interest You. Write For It

HYDRAULIC MACHINERY AND OPERATING VALVES

R. D. WOOD & CO.

ESTABLISHED 1803

PHILADELPHIA, PA.

CAST IRON PIPE, HYDRANTS AND VALVES

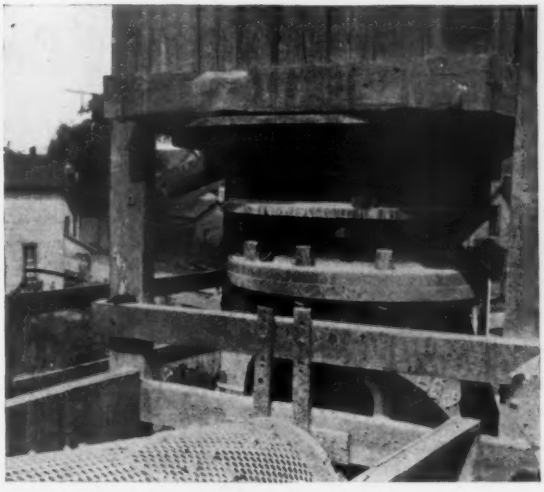
30% Greater Yardage

The California Construction Co. is now using five Twin-Cylinder Austin Motor Rollers on their Fresno County black base (asphaltic concrete) work. The photograph shows one of these machines rolling the seal coat — something that it had previously been thought could only be done by a steam roller.

The story of how the motor rollers are taxing the daily capacity of a 400-ton mixing plant, and speeding up the work all along the line, contains some valuable pointers for every paving contractor and engineer. It is now ready in printed form, and we will gladly mail you a copy.

THE AUSTIN-WESTERN ROAD MACHINERY CO.

Factories and Home Office:
CHICAGO
Branches Everywhere



No. 5
AUSTIN
Gyratory Crusher

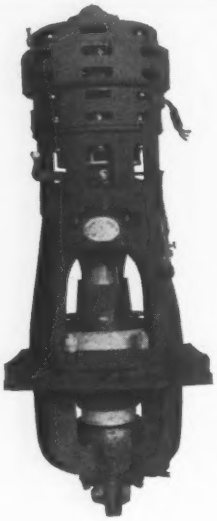
At the Plant of The Continental Clay Company, Columbus, Ohio

This Crusher is used to reduce the gravel chuted to it from the 2 in. screen to 1¼ in. and down. This profitable operation is carried on with a regularity of service that spells the difference between unbroken satisfaction and continuous annoyance.

Austin Gyratory Crushers are famous for this very kind of service. Catalog No. 29 tells the whole story of the construction and operating features that are behind it. We will gladly mail you a copy.

AUSTIN MANUFACTURING CO.
New York Chicago San Francisco

The Weston Direct Drive Gyratory Crusher for Secondary Reduction of Hard Rock, Ore and Gravel



Developed in a Granite Crushing Plant

This machine fills the need for a secondary crusher of large capacity and great strength for work in all friable rock.

The first machine, installed more than two years ago, has established remarkable records for capacity, low power consumption and general economy in operation. Later installations have more than proved all claims for the machine.

The construction is all-steel with Chrome-Vanadium forged steel shaft of large size, and with full-bearing eccentric, bronze bushed inside and out.

The entire machine is arranged to give freedom from costly delays. Positive lubrication without pumps—Dust prevention in bearings—Greater wear on manganese before replacement—Ease of adjustment and repair—and a sturdy oversize motor—All work to your advantage.

Crusher is simple in design and the best practice in modern Engineering is utilized. Built in six standard sizes to follow any primary, smallest machine can be set to ½" with large capacity.

Arranged for direct motor, or belt drive.

Bulletin No. 25-A describes this machine in detail

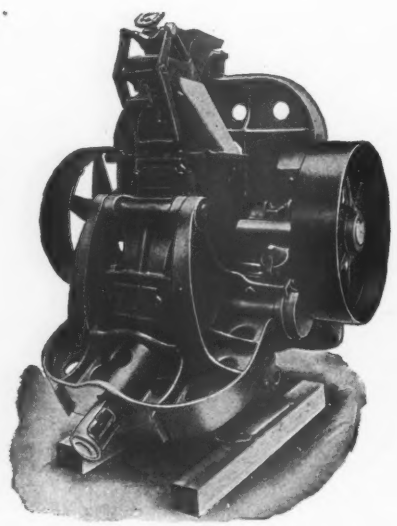
THE MORGAN ENGINEERING COMPANY

ALLIANCE, OHIO

Designers, Manufacturers and Contractors
Electric Traveling Cranes, Rolling Mill Machinery
Ordnance, Steel, Shipbuilding and Forging Plants Complete
Rock Crushers, Special Machinery for Any Purpose

Chicago
122 S. Michigan Ave.

Pittsburgh
1420 Oliver Bldg.
Birmingham, Ala.
Brown-Marx Bldg.



MAXECON MILL

For Fine Pulverizing of

Limestone, Gypsum, Phosphate, etc.

EFFICIENT—ECONOMICAL—RELIABLE

PERFECTECON SCREEN SEPARATOR

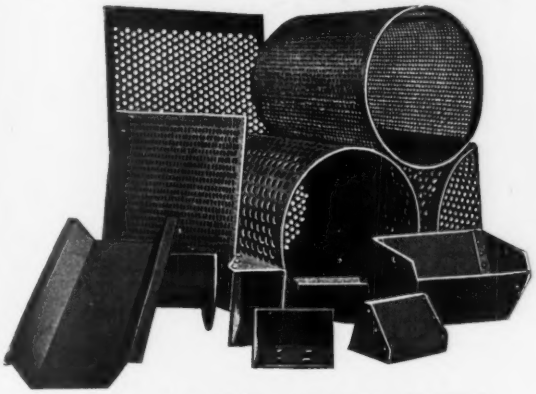
For Large Capacity Screening

Let These Solve Your Cost and Trouble Problems

KENT MILL COMPANY

10 Rapelye Street Brooklyn, N. Y.

Perforated Metal Screens
FOR
Stone, Gravel, Sand, Etc.



ELEVATOR BUCKETS
PLAIN AND PERFORATED

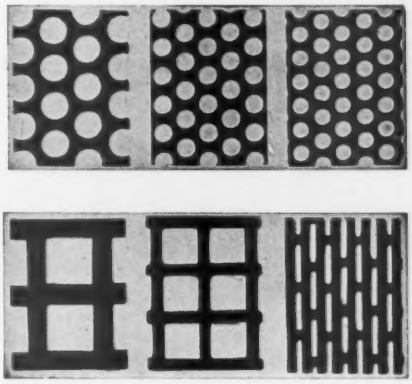
General Sheet and Light Structural Work

"Light and Heavy Steel Plate Construction"

HENDRICK MFG. CO.
CARBONDALE, PA.

New York Office, 30 Church Street
Pittsburgh Office, 544 Union Trust Bldg.
Hazleton, Pennsylvania, Office, 705 Markle Bank Bldg.

Perforated Steel Screens



For Screening Stone, Gravel, Sand and Cement

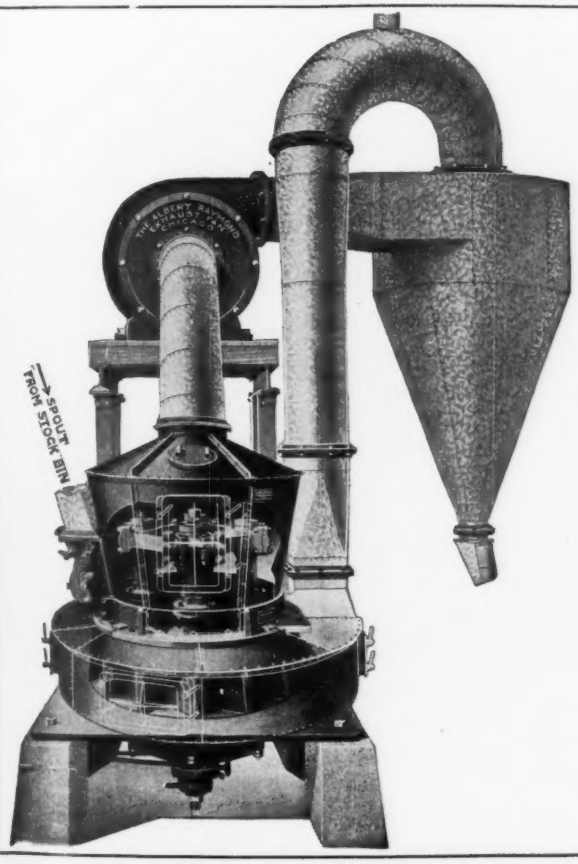
All sizes and shapes of holes in metal of proper thicknesses to give the best screening results.

Sheets furnished flat or rolled to shape for revolving screens.

THE HARRINGTON & KING PERFORATING CO.

5650 Fillmore St., Chicago, Ill.

NEW YORK OFFICE: 114 Liberty St.



STATISTICS

335 Raymond Roller Mills equipped with Air Separation are grinding coal in 130 Plants.

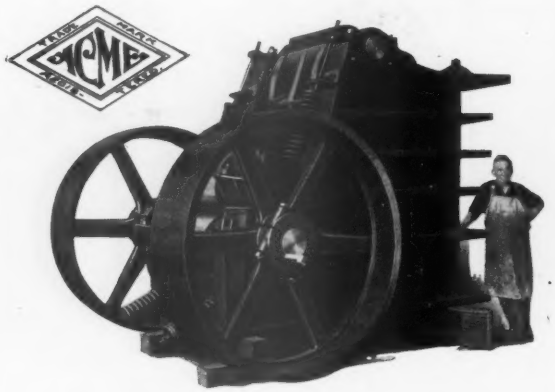
They are employed by Cement and Chemical Plants, Copper Refiners, in the Steel and Iron Industry and Power Plants.

Conservatively speaking they grind over 10,000,000 tons of coal per year.

Raymond Bros. Impact Pulverizer Co.

1301 N. BRANCH ST. CHICAGO, ILL.

Eastern Office, 50 Church St., NEW YORK CITY
Western Office, 1002 Washington Bldg., LOS ANGELES



Acme Steel Crushers

6x10 to 42x48

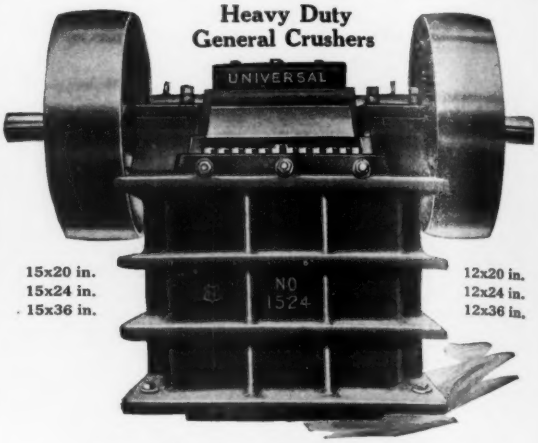
We have in stock for immediate delivery sizes up to 30x36, one piece frame, and up to 26x40, four piece frame.

Diecast Genuine Removable Bearings

Complete Quarry Equipment
Write for Catalogue 12-B

Acme Road Machinery Company
Main Office and Factory
Frankfort, N. Y., U. S. A.

Heavy Duty
General Crushers



15x20 in.
15x24 in.
15x36 in.

12x20 in.
12x24 in.
12x36 in.

YOUR CRUSHER

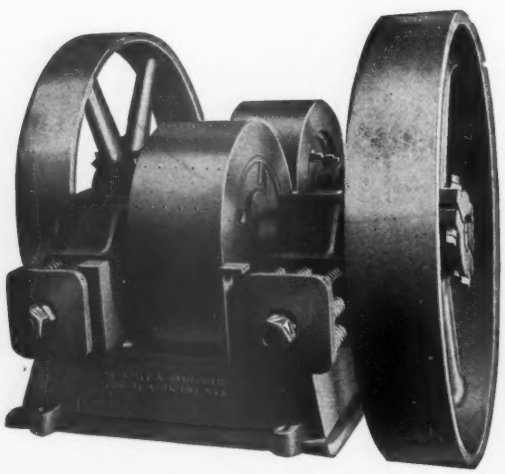
should be ***strong, durable*** and ***dependable***

OUR STEEL CRUSHERS

are all of that and more. Let us tell you how. Capacities 5 to 450 tons per day. Stationary or Portable.

Write for circular and prices

UNIVERSAL CRUSHER COMPANY
225 Third Street **Cedar Rapids, Iowa**

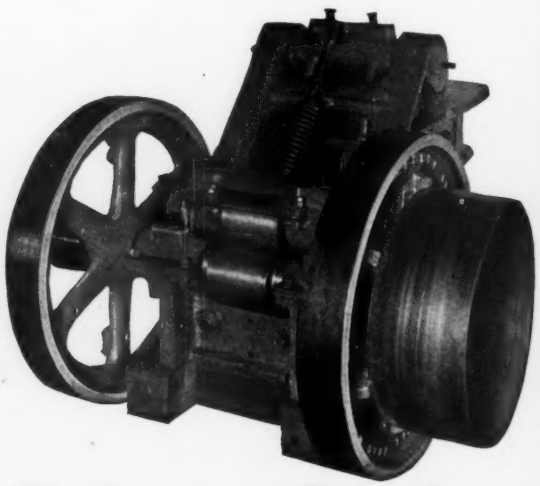


CRUSHERS—

Webb City & Carterville crushers, screens, elevator buckets, or transmission equipment have conspicuously demonstrated their superiority wherever they have been installed.

Write for Descriptive Circular

WEBB CITY & CARTERVILLE FOUNDRY & MACHINE WORKS
WEBB CITY, MISSOURI



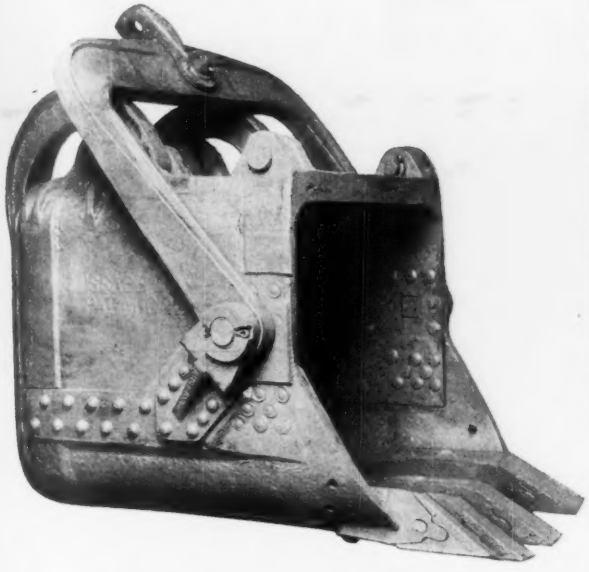
Reliance Crushers

IN ALL SIZES FOR EITHER PORTABLE PLANTS FOR ROAD BUILDING OR STATIONARY QUARRY INSTALLATIONS.

BUILT FOR LONG, HARD SERVICE—WILL SAVE YOU MONEY IN THE LONG RUN

Let us quote you prices

Universal Road Machinery Co., Kingston, N. Y.
Branches in all principal cities in U. S. and Canada
MANUFACTURERS OF THE FAMOUS RELIANCE LINE OF ROAD BUILDING AND QUARRY EQUIPMENT



Amsco Missabe Manganese Steel Dipper, Equipped With Clark Reversible Dipper Teeth

Among the many desirable and exclusive features that help to make this the ideal bucket for the heavy work encountered in quarry service are:

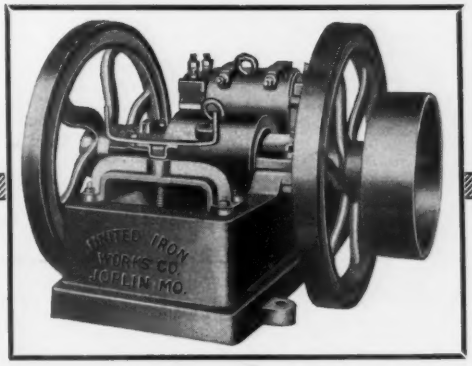
1. The body proper consists of a front and back casting, securely riveted together, affording a very rugged construction, with the fewest possible parts.
2. The bail brackets attached to the front casting, set at the proper angle, throw all the digging strain on the front, which is strong enough to properly sustain it, eliminating the shearing of rivets and the pulling apart of the front and back castings.
3. All pin holes, in which severe wear occurs, are fitted with renewable keyed-type bushings of managanese steel, increasing service. There are many other desirable features which are explained in our Missabe Dipper Bulletin. Write for your copy today.

Clark Reversible Dipper Tooth

A heavy duty two-part tooth constructed to give maximum service under the most severe digging conditions. The design insures rigidity of the tooth and eliminates any possibility of the point becoming loose or dropping off.

Get our liberal exchange proposition on dipper teeth

American Manganese Steel Company
General Sales Office:
398 East 14th Street, Chicago Heights, Illinois
FOUNDRIES: Chicago Heights, Ill.; New Castle, Del., and Oakland, Cal.



The "United" Crusher

The wearing parts of the "United" Blake Type Jaw Crusher are made from a special semi-steel mixture, the wearing qualities of which approach that of steel at a fractional cost.

These crushers are furnished in eight sizes, openings from 7x10" to 12x24" with capacities from 6 to 35 tons per hour.

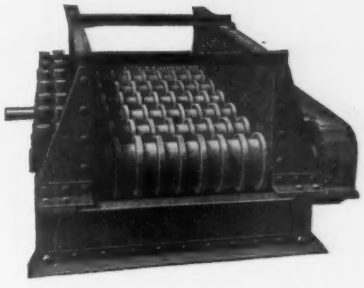
We guarantee prompt shipments of any repair part required.

Send for Special Bulletin

UNITED IRON WORKS, Inc.
General Offices, Kansas City, Mo.

"UNITED" IRON WORKS INC. FOR SERVICE

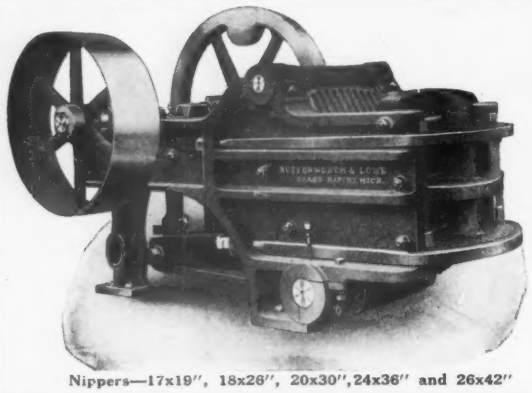
ROBINS
Cataract Grizzly
For a Perfectly Sized Product



It is ruggedly constructed; occupies small space; takes but little power; gives a clean product. Machines built to handle up to 1,000 tons per hour and to make any desired separation between 1 inch and 6 inches.

Write for Bulletin No. 60

Robins Conveying Belt Company
New York Chicago Pittsburgh Boston



Nippers—17x19", 18x26", 20x30",24x36" and 26x42"

JAW & ROTARY CRUSHERS

For All Rocks and Ores Softer Than Granite

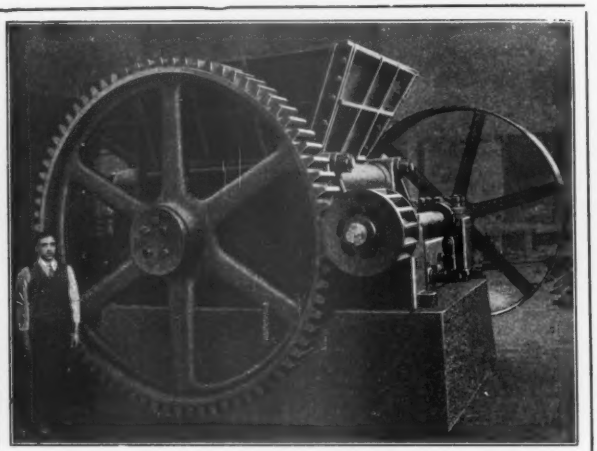
GYPSUM MACHINERY—We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.

Special Crusher-Grinders for Lime

20" to 47" inside diameter. Many variations

Butterworth & Lowe

17 Huron St. Grand Rapids, Mich.



If you had seen the McLanahan Single Roll Crusher before ordering your first Gyratory or Jaw Crusher, you would now be running only the McLanahan Crushers.

After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

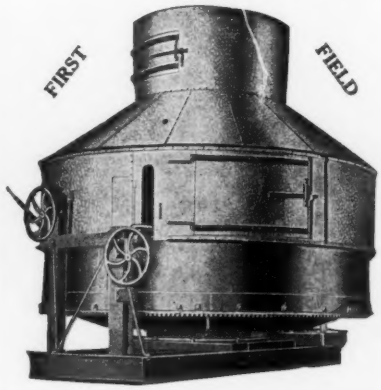
Capacity, 5 to 500 Tons Per Hour

McLanahan-Stone Machine Co.

Hollidaysburg, Pa.

Screens, Elevators, Conveyors, Rock Washers, Etc.

IN THE FIRST FIELD



The CLYDE Hydrator

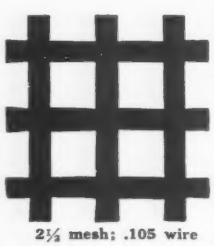
The Clyde Hydrator is a batch mixer. You weigh in the given amount of lime and measure in from a tank the given amount of water. The Clyde thoroughly mixes the two together and every particle of lime receives the right amount of water. This assures you of the best product that can be gotten from the material furnished. Your hydrate is always in plain sight so you can see when it is thoroughly hydrated.

H. MISCAMPELL

Patentee and Sole Manufacturer

DULUTH Patented Nov. 29, 1921 Serial No. 1398238 MINNESOTA

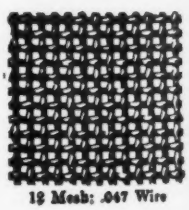
"CLEVELAND" DOUBLE CRIMPED WIRE CLOTH



2½ mesh; .105 wire

A uniform fineness is assured by the use of "Cleveland" Double Crimped Wire Cloth, making it unequalled for the screening of Sand, Gravel, Crushed Stone and Cement. "Service" is the definite policy of this organization, and through every phase of manufacture this end is constantly before us.

A large stock always on hand. However, any special mesh will be manufactured to suit requirements. PRICES RIGHT



18 Mesh; .047 Wire

THE CLEVELAND WIRE CLOTH AND MANUFACTURING COMPANY

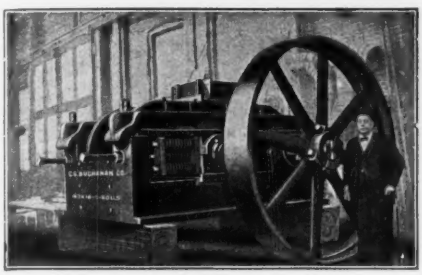
3573 East 78th Street Cleveland, Ohio

J. C. BUCKBEE COMPANY
Engineers *and* Contractors
CHICAGO, ILL.

Design and build cement plants, rock crushing plants, power plants and industrial structures.

Examinations, Reports and Valuations of Industrial Properties

BUCHANAN CRUSHING ROLLS

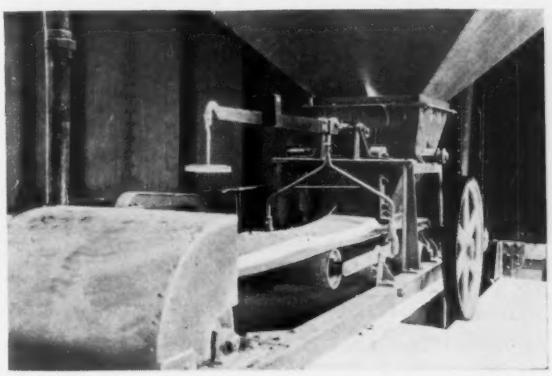


Type "C" Buchanan Box Bed Crushing Rolls for Heavy Duty Bulletin No. 13

Years of manufacturing experience, combined with an intimate knowledge of the conditions under which such machines operate, assures the purchaser of Buchanan Equipment machines of remarkable durability.

COMPLETE CRUSHING PLANTS

C. G. BUCHANAN CO., Inc.
Cedar and West Streets NEW YORK CITY

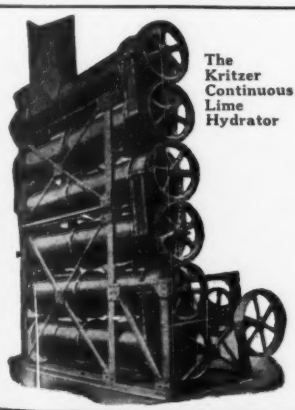


SCHAFFER POIDOMETER

The Schaffer will deliver bulk materials in lots of whatever weight is set providing absolute accuracy.

The Poidometer can save money by eliminating losses due to spillage.

Schaffer Engineering & Equipment Co.
2828 Smallman Street
Pittsburgh, Pa.



The Kritzer Continuous Lime Hydrator

HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

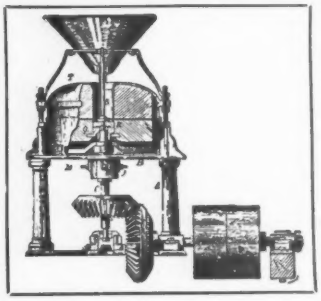
THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

THE KRITZER COMPANY
503 South Jefferson Street CHICAGO, ILL.

Do You Do Fine Grinding?

THE Munson Underrunner Buhr Mill has stood the test of time and is still first choice with a large number of concerns whose product demands fine, uniform grinding.



This mill is particularly well adapted for grinding limestone, gypsum, hematite ores, slate and similar materials, though in actual service is is used on a much wider variety of products.

Send us a sample of the material you wish ground so that we may tell you the possibilities of the "MUNSON."

Catalog No. 71 tells more about these mills.

Munson Mill Machinery Co., Inc.
Est. 1825 **Utica, N. Y.**

YORK LIME KILNS

Special Kilns For Special Purposes

We also manufacture:
Dryers
Hydrators
Gas Producers
Rotary Screens
Tanks
Grey Iron Castings
Special Machinery from Engineers' Designs

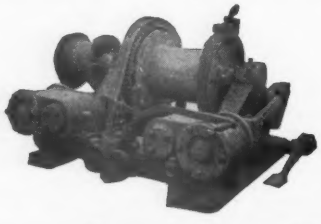
Keeping up with progress in the lime industry does not necessarily mean the scrapping of your present plant.

We fit our modern kilns between old-style kilns so as not to conflict with old plant arrangements. In keeping with this idea, we are modernizing the plant of the Cheshire Lime Co., Cheshire, Mass., in just this way.

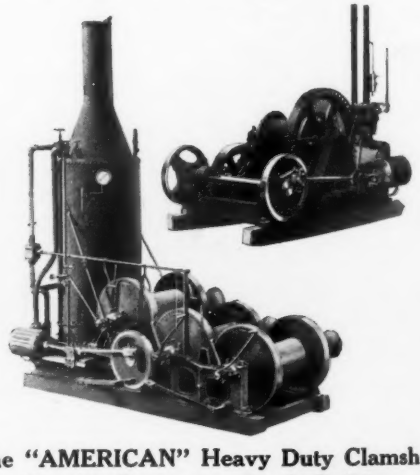
Working in co-operation with the foremost lime and hydrating engineers in the country enables us to achieve efficiency and economy.

McGann Manufacturing Company, Inc.
Works, York, Pa.
332 S. Michigan Ave., Chicago 50 Church St., New York

FOR SALE



Emerson-Brantingham Hoists
UNUSED
DOUBLE CYLINDER, SINGLE DRUM, IN FIRST CLASS CONDITION
$125.00 Each F. O. B. Chicago
Capacity, 10,000 Pounds—IMMEDIATE SHIPMENT
Detailed Specifications Furnished on Application
"QUANTITY IS LIMITED"
Relaying Rails and Angle Bars
All Weights and Tonnages for Prompt Shipment
Get Our Quotations
HYMAN-MICHAELS CO.
531 Peoples Gas Bldg., Chicago, Ill.



The "AMERICAN" Heavy Duty Clamshell Derrick Engine is a Profit Builder

When you buy a clamshell derrick hoist the big thing to be sure of is ample capacity. There will be no question about this if you buy an "AMERICAN" Heavy Duty Clamshell Derrick Engine—9 x 10 size for a 1½-yard bucket; 10 x 12 size for a 2-yard bucket—and an "AMERICAN" 5 x 7 or 7 x 8 Independent Slewing Engine.

AMERICAN HOIST & DERRICK CO.
Saint Paul, Minn.
New York - Chicago - Pittsburgh - Seattle - New Orleans - Detroit

For thirteen years this

Industrial Crane

Has been in use at the Lee Marble Works, Inc., Lee, Mass., and still operating satisfactorily in every way. For loading and unloading at the mill, for handling of block in storage, this INDUSTRIAL is much more efficient and permits spreading of materials to better advantage.

Our Golden Anniversary Catalog of INDUSTRIAL Cranes Sent Immediately on Request

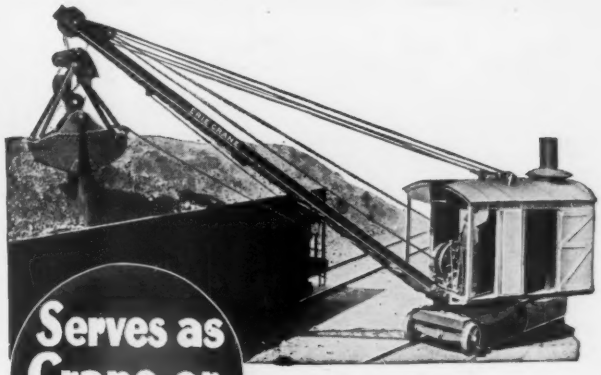
Industrial Works, Bay City, Michigan

New York Chicago Philadelphia Detroit

SALES ENGINEERS IN ALL PRINCIPAL CITIES

1873 BUILDERS OF CRANES FOR 50 YEARS 1923

Oldest and Largest Manufacturers of Cranes in the Country
17 Different Types, Capacities 5 to 200 Tons



Serves as Crane or Steam Shovel

Every ERIE can be quickly and easily changed over to a Locomotive Crane. Gives excellent service with clamshell bucket — excavates gravel, loads cars, handles storage, etc.

In the hardest steam shovel service, gravel producers and quarrymen have found the ERIE very sturdy and reliable.

"Our first ERIE has been digging hard gravel for 3 years without any repairs. We have in the past operated other steam shovels that are good, but the ERIE is the best, being by far the most substantial." Write the Standard Buiders' Supply Co., Grand Rapids, Mich. They own 2 ERIES, a Steam Shovel and a Crane.

Write for Bulletin P-16, showing just what you can do with the ERIE, both as crane and steam shovel.

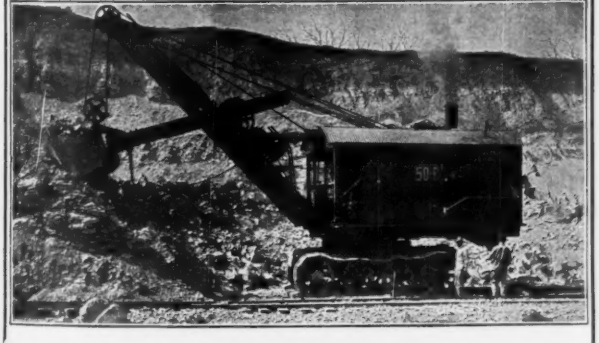
ERIE STEAM SHOVEL CO., Erie, Pa., U. S. A.
Builders of ERIE Steam Shovels and Locomotive Cranes

ERIE Revolving Shovels

Bucyrus 50-B Revolving Shovel

The ideal revolving shovel for quarry service and gravel pits—
1½ to 2 cubic yard dippers, depending on character of material to be handled.
Built with a strength and power to give steady service with the least possible maintenance.
The only revolving shovel of this size equipped with a locomotive boiler.
Readily equipped as a dragline excavator, clamshell excavator or crane.

Send for Bulletin C-501-P



BUCYRUS

Bucyrus Company, South Milwaukee, Wis.

518

Flirting With the Shovels

In the game of crushed stone quarrying a drill that is within flirting distance with steam shovel or the loading gangs is in a dangerous position. A breakdown on the drill, and the whole production schedule is upset.

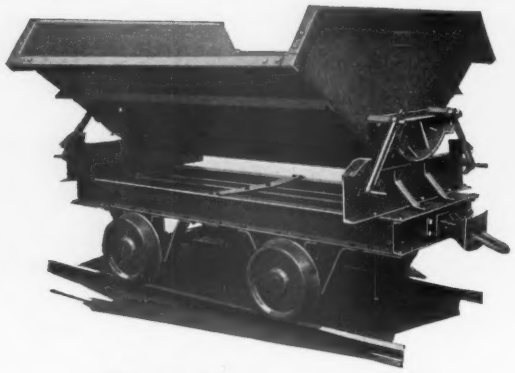
No. 14 Cyclone Drills, on the job, always keep plenty of stone ahead, and if they should ever be crowded there is no need for worry—the working parts are cast steel, reducing to the very minimum all possibility of breakdowns.

Write for "Big Blast Hole Drills," a semi-technical treatise on quarry drilling and also containing a complete description of Cyclone No. 14 Big Blast Hole Drills.

The Sanderson-Cyclone Drill Co.
Orrville, Ohio

Eastern and Export Office: 30 Church Street, New York City

EASTON QUARRY CARS



TYPE 6013

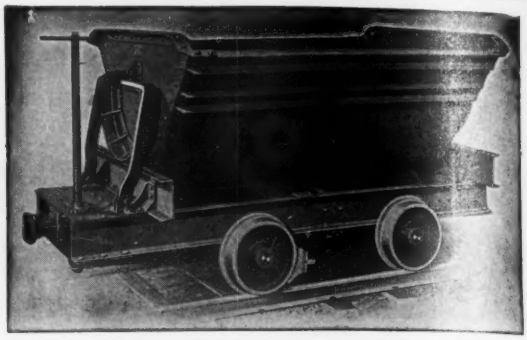
EASTON CAR & CONSTRUCTION CO.
EASTON, PENNSYLVANIA

"QUARRY CAR PRACTICE"
Issued every now and then

SALES OFFICES

Hudson Terminal, New York
Morris Building, Philadelphia
Kunkel Building, Harrisburg
Jefferson Building, Birmingham
Hearst Building, San Francisco
Oliver Building, Pittsburgh
McKevitt Building, Norfolk
Andrews Law Building, Spartanburg

EASTON INDUSTRIAL CARS



More Than Reinforced

Reinforcing a dump car makes it stronger, of course. But there is a best way to reinforce. Atlas cars are reinforced the best way. Why? Simply because we have built dump cars so long and for so many people that we know just where the reinforcing should go and just how it should be done.

Not much wonder, then, that Atlas dump cars stand the "gaff" better than the average.

The Atlas Car & Manufacturing Co.
ENGINEERS MANUFACTURERS
CLEVELAND, OHIO, U. S. A.

Free Service to Readers of
Rock Products

If you are in the market for any kind of machinery, equipment or supplies, or if you desire catalogs, information or prices on any product, we are at your service—to obtain for you, without expense, catalogs, prices or specific information on every kind of machinery, equipment and supplies—or to help you find the hard to find source of supply.

RESEARCH SERVICE DEPARTMENT

ROCK PRODUCTS, 542 So. Dearborn St., Chicago, Illinois

Please send me catalogs and prices concerning the following items:

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Name.....

Address.....

City..... **State**.....

Duplicate and Repair Parts Supplied for All Locomotives

EVERY user of motive power knows the value of our service in supplying duplicate and repair parts to maintain locomotives in active service. Locomotives awaiting repairs are a source of great financial loss to their owners — whether main line railroads or industrial companies—and it is our constant aim to forward spare parts promptly.

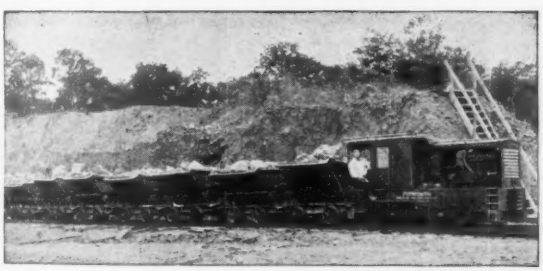
We suggest that you keep on hand a supply of those parts most likely to need replacement, and avoid unnecessary delays in making repairs.

The Baldwin Locomotive Works
Philadelphia

DAVENPORT LOCOMOTIVES

Construction requirements at our plant make possible the greater number of actual hours of hauling found in Davenport Locomotives.

DAVENPORT LOCOMOTIVE WORKS
Davenport, Iowa



21 Plymouth Locomotives Owned by Morris County Crushed Stone Co.

The Morris County Crushed Stone Co. of Morristown, N. J., and its subsidiaries are one of the biggest producers of crushed stone in the country.

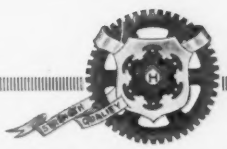
In 1915 Mr. F. W. Schmidt, President, bought their first Plymouth Locomotive. Repeat orders followed until now 21 Plymouths take care of their haulage burden. They write:

"We still have in operation the first Locomotive we purchased from you in 1915. This Locomotive is still doing its bit, which speaks pretty well of your machine."

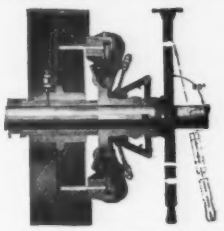
Write for Catalog and Performance Bulletins.

THE FATE-ROOT-HEATH CO., Plymouth, Ohio

PLYMOUTH
Gasoline Locomotives



HILL FRICTION CLUTCHES



Sectional View Hill Clutch Pulley, Smith Type. Built solid or split in sizes from 9 to 1300 H.P. at 100 R.P.M.

Superiority—The Hill Clutch Co. has unequalled facilities for the design and manufacture of friction clutches. For 39 years Hill power transmission has been acknowledged to lead all others. No other manufacturer has had a wider experience in the manufacture of friction clutches, and complete power transmission machinery equipment or a greater knowledge of the varying conditions of operation that must be met.

Efficiency—The advantages of the Smith Type clutch lies in its unequalled mechanical stability, tremendous starting power, ease of adjustment, and removal of wearing parts.

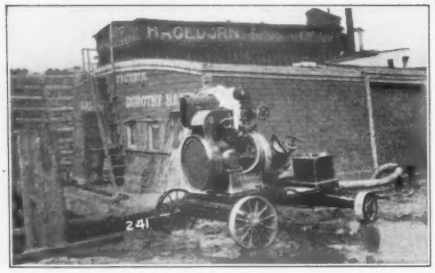
Send for Catalog

THE HILL CLUTCH CO.

General Office and Plant
Cleveland, Ohio

New York Office
50 Church St.

PENNSYLVANIA



THE PENWAY PUMPER

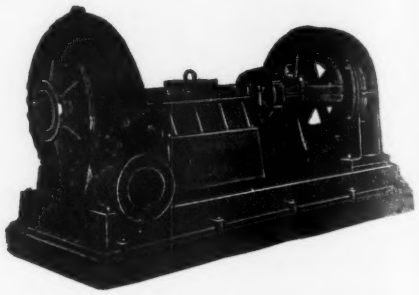
A compact, light, portable gasoline - kerosene engine driven pumping unit, having a maximum capacity of 350 gallons of water per minute.

Its field covers contracting and excavation work, and portable and emergency work of all kinds.

PENNSYLVANIA PUMP AND COMPRESSOR COMPANY

MAIN OFFICES AND WORKS EASTON, PA.

BRANCH OFFICES:
325 Penfield Building, Philadelphia, Pa.
50 Church Street, New York City
105 West Monroe Street, Chicago, Ill.



Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4 in. up, arranged for belt, motor, or engine drive.

MORRIS MACHINE WORKS
50 Genesee St. Baldwinsville, N. Y.

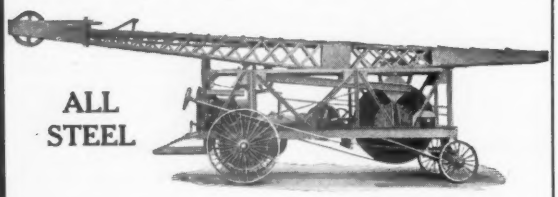
39 Cortlandt St., New York City
Forrest Bldg., Philadelphia, Pa.
217 N. Jefferson St., Chicago, Ill.
Penobscot Bldg., Detroit, Mich.

Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

MORRIS

Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines

ARMSTRONG



ALL STEEL

Blast Hole Drill

It is Actual Drilling Time — the hours you run without a stop or shut down—that produces the footage. Real work on the ledges of scores of quarries has proven that the Armstrong stands up better, does more work with less idle time and produces more hole than any other blast hole drill on the market. Make us prove it. Write today.

Armstrong Manufacturing Company
310 Chestnut Street Waterloo, Iowa

The Morgan Producer Gas Machine

is the highest class gas producer built in the U. S. and is advertised in this journal the second issue of each month.

Morgan Construction Company
Worcester, Mass.

W. D. Mount, 601 Peoples National Bank Bldg., Lynchburg, Va., Representative in the Lime Industry

We Look Into the Earth

By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all minerals.

We are fully equipped for testing foundations for bridges, dams, buildings, and all work of a similar character.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

AJAX

BULL BEARING ALLOY

"Better than Babbitt"

Ajax Bull Bearing Alloy in your crusher bearings prevents frequent re-babbitting and is a safeguard against costly breakdowns. We'll prove it.

Send for circular A and our offer.

The Ajax Metal Company, Philadelphia

Established 1880

New York Chicago Boston Cleveland

ANCHOR BRAND COLORS

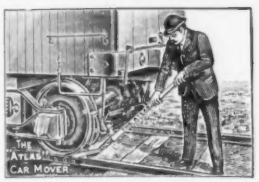
For Mortar, Cement and Brick—Brown, Black, Red and Buff —Strongest and Most Durable

Manufactured by

C. K. Williams & Co.

Correspondence Solicited EASTON, PA., U. S. A.

ATLAS CAR MOVER



The Atlas Car Mover will move a car farther at a stroke and with less effort than any other car mover on the market.

They save time and money. You cannot afford to be without a few.

State what style rail to be used on. We will then know what style to send you.

Write for Prices Today

ATLAS RAILWAY SUPPLY CO.

431 South Dearborn Street Chicago, Ill.

EMERSON STEAM PUMPS

The Emerson Pulsating Pump is a very interesting piece of machinery. Its economy and efficiency during the past twenty-five years have impressed every user to the point of enthusiasm.

The Emerson Pump & Valve Company, Inc.

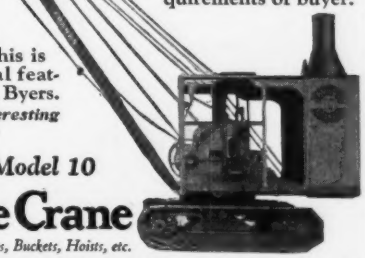
Alexandria, Va.

Get a Practical Crane

Furnished in mounting and power to suit requirements of buyer.

BOOM can be raised or lowered under load while operating—this is one of the practical features, exclusive with Byers.

Write us for interesting bulletins.



BYERS Model 10

Full Circle Crane

Also Auto-Cranes, Truckranes, Buckets, Hoists, etc.

THE BYERS MACHINE COMPANY, 310 Sycamore St., Ravenna, O.

O. S. DEPENDABLE

CRANES SHOVELS BUCKETS

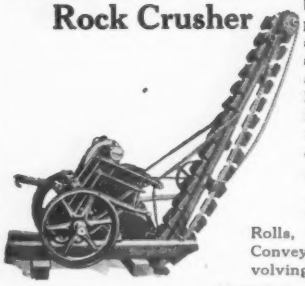
Write for Catalog No. 24

Orton & Steinbrenner Co., 608 South Dearborn St., Chicago

Chicago Office: Railway Exchange Bldg. New York: 30 Church St.

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

New Holland Rock Crusher



New Holland Rock Crushers will crush oversize from gravel banks or from larger crushing plants into finer grades, thus securing highest prices. They are durable and inexpensive and run on small power with little attention. Built in sizes from 2 to 15 tons per hour, requiring 5 to 15 h.p. to operate.

Write for descriptive catalog and prices on New Holland Rock Crushers, Recrushing Rolls, Rock Pulverizers, Elevators, Conveyors of various types and Revolving Screens.

Manufactured by
New Holland Machine Co., New Holland, Pa., U. S. A.

End crusher breakage

with Dings "High Intensity" Magnetic Pulleys

You can't keep iron out of rock. At some stage it enters—bolts, nuts, tie rods, mule-shoes. Then if it doesn't do damage to the crusher, you're lucky.

No, you can't keep iron out of rock—but Dings Magnetic Pulleys will keep it out of crushers. No breakage—no repairs—no shut-downs. *Ask for the bulletin.*

Dings Magnetic Separator Company
803 Smith Street, Milwaukee

The Merrick Conveyor Weightometer

Any material which is conveyor-handled can be weighed without additional handling or loss of time by the Merrick Conveyor Weightometer.

An Automatic—Continuous—Accurate Record

Merrick Scale Mfg. Company
Passaic, N. J.

CROSS ENGINEERING CO. CARBONDALE, PA. PERFORATED SHEET METALS

Our screens produce a product clean and perfectly sized.

We can supply repair and renewal parts quickly and correctly. Rush orders can be filled promptly because of our stock of 500 tons or more of steel plates.

Cross Engineering Company
Offices and Works:
Carbondale, Pa.

And They Lived Happy Ever Afterwards

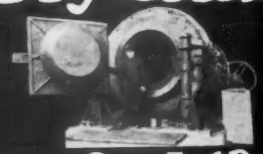
—So read fairy tales. However, we can tell you true tales of harassed operators who have found their haulage problems permanently and happily solved by installing an

AUTOMATIC AERIAL TRAMWAY

It Is Not Time Wasted to Investigate—Write Us

INTERSTATE EQUIPMENT CORPORATION
25 Church Street New York City

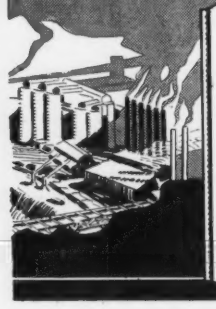
For Dry Grinding



The Marcy Open End Rod Mill
BUILT BY
The MINE AND SMELTER SUPPLY COMPANY
DENVER SALT LAKE CITY EL PASO
NEW YORK CITY 42 BROADWAY SAN FRANCISCO MILLS BUILDING

SIL-O-CEL

PREVENTS HEAT PENETRATION



Heat Insulation
for Cement Kilns and Waste Heat Boilers

Sil-O-Cel Insulation possesses a lower heat conductivity than any other known material and will withstand extremely high temperatures. Furnished in convenient forms for easy application.

Detailed information and blueprints sent upon request. Write for Bulletin S-95.

CELITE PRODUCTS COMPANY
New York 11 Broadway Chicago 53 W. Jackson Blvd. San Francisco Monadnock Bldg.
CELITE PRODUCTS LIMITED, New Birks Bldg., Montreal, Canada
OFFICES AND WAREHOUSES IN PRINCIPAL CITIES

Scientifically Designed Equipment

Zepp Automatic Hydrator
Meade Improved Lime Kilns
Complete Lime, Cement and Plaster Plants

Efficiency of Operation—Low First Cost

RICHARD K. MEADE & CO.
Chemical and Industrial Engineers
11 E. Fayette St. Baltimore, Md.

ROBERT W. HUNT CO.

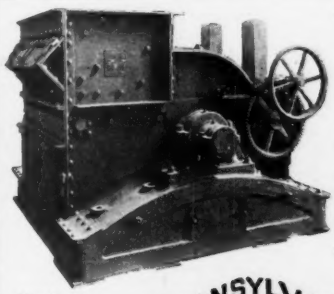
Inspection—Tests—Consultation

Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

INSPECTION AND TESTS OF SAND, GRAVEL, CEMENT, STRUCTURAL STEEL, CASTINGS AND CONSTRUCTION MATERIALS

Cement, Chemical and Physical Testing Laboratories

CHICAGO
New York 2200 Insurance Exchange Pittsburgh
St. Louis Kansas City Cincinnati San Francisco



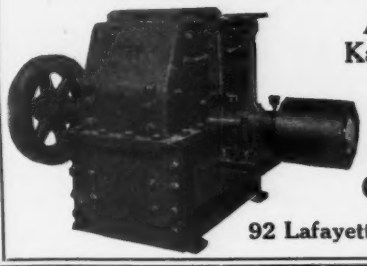
"PENNSYLVANIA" CRUSHERS

for Limestone, Cement Rock, Shale, Lime, etc.
(a) Steel Frame Construction.
(b) Over-size Bearings.
(c) Tramp Iron Separator.
(d) Quick-acting Cage Adjustment.
(e) Steel Wear Liners.
Also Single Roll Crushers and Bradford Coal Breakers.

Put your Reduction Problems up to us.

Merchants Bank Bldg. Chicago
PENNSYLVANIA CRUSHER COMPANY
Stephen Girard Bldg., Philadelphia
50 Church St. New York
Oliver Bldg. Pittsburgh

On a cost-per-ton-of-output basis your next crushing unit must be a K-B PULVERIZER



All-Steel Kant Break
K-B
Pulverizer Corporation
92 Lafayette St., New York

FULLER PRODUCTS

Insure Fullest Satisfaction

Crushing Rolls.
Pulverizer Mills.
Direct and Indirect Fired Dryers.
Ball and Tube Mill Liners and Partition Plates.
Fuller-Kinyon System for Conveying Pulverized Materials.
Sprockets, Traction Wheels, and Roll Heads.
All kinds of High Grade Chilled Charcoal Iron Castings for All Uses.

Ask for catalogue and prices

FULLER-LEHIGH COMPANY
Fullerton, Pa., U. S. A.

REPEAT orders indicate satisfied customers. That's why we are proud of the fact that a large percentage of our sales are to people who are already operating Sauerman Cableways. One large sand and gravel company has seven of our machines installed at their different plants. If you wish to know why our equipment is so popular, send for Pamphlet No. 17.

SAUERMAN BROS.
430 South Clinton Street Chicago

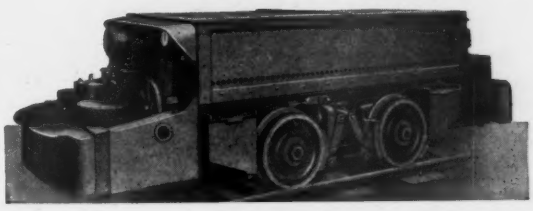
SAUERMAN DRAGLINE CABLEWAY EXCAVATORS
dig. convey. elevate and dump in one operation

CRESCENT BELT FASTENERS
They Insure Full Power Transmission
They Sustain the Belt's Full Strength
They Make Good Belts give Better Service
CRESCENT BELT FASTENER CO.
381 FOURTH AVE. NEW YORK.

THE IRONTON STORAGE BATTERY LOCOMOTIVE

Efficient, economical hauling. Find out about storage battery locomotives for your hauling. The Ironton is the best storage battery locomotive.

The Ironton Engine Co.
Ironton, Ohio



Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion

FOR SALE

1—"GATES" 6 x 15 Dry Process ComPeb Mill complete with Chilled Iron Liners, mill arranged for right hand motor belt drive. Purchased September, 1920.

1—"STINE" No. 8 Special Horizontal Type Incline Plane, 6 to 8 ton capacity on 29 degree incline. Purchased February, 1921.

Equipment in EXCELLENT condition. PRICES RIGHT.
Other types of equipment also for sale.

THE STANDARD LIME & STONE CO.
524 Equitable Building **Baltimore, Md.**

FOR SALE

1—70 ton Steam Shovel
15—5 ton steel body, end dump, heavy duty standard gauge Quarry Cars.
1—No. 4B Gates Crusher.

All in good working order. Low prices to move quickly

INLAND CRUSHED STONE CO.
105 North Clark Street **Chicago, Ill.**

FOR SALE

1—Jeffrey type "B" Hammer Pulverizer, size 24x20, 1350 R.P.M. Only used few months to manufacture ground limestone.
1—Foos 150 H.P. 14x14 three-cylinder, vertical type Gas Engine, now operating on natural gas, with drive pulleys and friction clutch; out-board bearings; air compressor and tanks for starting.

Above equipment in excellent operating condition.
Enlarging our plant and will sell at a bargain to quick cash buyer.

THE ABEL MAGNESIA COMPANY
Cedarville, Ohio

FOR SALE

The following Gyratory Crushers, located in Tennessee and North Carolina, Manganese fitted.

1 No. 10K Allis Chalmers
1 No. 9K Allis Chalmers
3 No. 6K McCully
1 No. 5K Allis Chalmers
1 No. 5 Austin

THE EQUIPMENT SALES COMPANY
Nashville, Tenn.

"Wire us your requirements at our expense."
"If we don't have it we will get it."

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½ x25′, 4x30′, 5½x50′, 6x60′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 4x40′, 5x50′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 5x4′, 3x3½′ pebble and ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 12x26″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24″, 36″ and 40″ cage mills; 3′ and 4½′, 6′ and 8′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens; Richardson automatic scales; 8′ and 10′ Emerick air separators.

Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

FOR SALE

3—72-ton 6-wheel switching locomotives
1—59-ton 6-wheel switching locomotive
2—42-ton Shay geared locomotives
2—70-ton Shay geared locomotives
1—24-ton Heisler geared locomotive.

Numerous other items. Complete list furnished on request

Birmingham Rail & Locomotive Co.
Birmingham, Ala.

FOR SALE

Two 150 H.P. General Electric Induction Motors, voltage 440, 60 cycle, 3 phase, with starter, complete
Williams No. 9 Universal type pulverizer, complete
Williams No. 3 Hammer Mill, complete
Sturtevant No. 0 Rotary fine crusher
Jeffrey No. 2 limestone pulverizer on trucks with steel elevator

Address E. W. Cooper
174 Third Avenue, North
Nashville, Tenn.

For Sale—STEAM SHOVEL

⅝ YD. THEW "O" TRACTION

Thoroughly rebuilt; attractive terms for quick sale.

Walter A. Zelnicker Supply Co., St. Louis
Rails, Locomotives, Cars, Tanks, Pipe

Mine Cars, Rails and Locomotives

We have a number of good, serviceable, standard gauge, second hand locomotives, and narrow gauged ones, for immediate shipment.

M. K. FRANK
Frick Building **Pittsburgh, Pa.**

GYRATORY CRUSHERS

No. 21K GYRATORY, COMPLETE PLANT
Nos. 21, 12, 10, 9, 7½ and 6 CRUSHERS
No. 3 Gates Portable Outfit

ROLL CRUSHERS

18x30 in. McLanahan Single Roll
24x54 in. Traylor Crushing Roll
84x72 in. Edison Crushing Rolls

JAW CRUSHERS

60x84 in. P. & M. Jaw Crusher
36x48 in. Allis Jaw Crusher
24x36 in. Traylor Jaw Crusher
NEW 22x50 in. Jaw Crusher
15x24 in. P. & M. Jaw Crusher
12x15 in. Champion Portable Crusher
36x24 in. SYMONS DISC CRUSHERS
Many others—send us your inquiries

Ross Power Equipment Co.
Indianapolis, Ind.

Used Equipment

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ROTARY DRYERS

30—New Direct Fired Rotary Dryers, 4'-0" diam., 30'-0" long. These Dryers were about to be put into operation as the Armistice was signed, and consequently were never used. We are offering them at a sacrifice, complete, with driving mechanism, furnace irons, grates, etc. Some are equipped with steam radiators for steam heated air drying.

McDERMOTT BROS. CO.
Allentown, Penna.

Cadman Pacific Lime and Plaster Co., 58 Sutter Street, San Francisco, desires large, second-hand rotary kiln complete, without brick. Send full description and location by wire as representative will leave for East shortly.

Wanted to Buy Rotary Kilns

Prefer 8x110', or could use larger. Give complete description, location and price.

Box 1718, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

For Sale—Steam Shovels

1—70 C. Bucyrus, 2½ yd. Bucket.
1—60 Marion, 2½ yd. Bucket.
Both standard gauge. Immediate shipment.

Consolidated Products Co., Inc.
15 Park Row New York, N. Y.

WANTED TO BUY

No. 12, 15 or 21 Gyratory Crusher. Give complete description, location and price.

Box 1721, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

4 Point "Drill Steel"

50 pieces 1½-in. round hollow Drill Steel, 10 ft. to 25 ft. long; every piece straight, clean cut, 4 point ends. All good as new. Bargain.

The General Equipment Company
P. O. Drawer 45 Syracuse, N. Y.

WANTED

One Clam Shell Derrick complete with boiler, engine, 90 ft. mast, 75 ft. boom, bull wheel, guys, ¾ yd. bucket and tackle.

Reply to MR. ROBERT
Room 604, 177 State St. Boston, Mass.

WANTED

Used Monigan Dragline

80 ft. boom. 2½ or 3 yd. bucket or its equivalent.

GRAND RAPIDS GRAVEL CO.
Grand Rapids, Mich.

Classified Advertising

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Type ads only. No cuts or illustrations permitted unless at the regular display advertising rates. Please send check with order. These ads must be paid for in advance of insertion.

Talc and Soapstone Deposits in Wisconsin for Sale

Deposits underlying 160 acres of land in Central Wisconsin, four miles over daily patrolled highway to R. R. station. Passed upon by Geological Dept. at Madison; also Washington, D. C. Samples furnished to interested parties. Will show this property at any time. Can give clear title. Wonderful opportunity for promoter or man with capital. Talc lies in massive formation, quality improving with depth. One point outcrops 16 inches below surface; 1000 feet from this, 10 feet below. Address **C. C. Trowbridge, Oakfield, Wis.**

Wanted—Superintendent

Experienced man capable of taking charge of crushed stone plant and producing results. Plant located in southeastern Iowa. A splendid opening for right man. Address

Box 1722, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

Take advantage of the Opportunity offered in the Used Equipment Department to dispose of the equipment that you no longer need.

FOR SALE

Sand Plant, equipped with pump boat and drag line, located on the river and five Trunk Line Railroads. Address

A. B. C., Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

WANTED

An experienced quarry operator accustomed to volume production, and having about $50,000 capital. An unusual opportunity for the right man. Address

Box 1720, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

WHITE CRYSTAL MARBLE QUARRY AND MILL FOR SALE—IDEAL MARBLE FOR STUCCO DASH

A fully developed White Crystal Marble Quarry and Mill in New York State. Quarry contains 65 acres, all marble. This quarry is exceptionally sound and uniform in color and the white crystals in it make it most desirable for Stucco Dash. The equipment is complete for both quarry and mill. Reason for selling, have many other large contracts and cannot give this one my time. Address answer,

Box 1713, Care of Rock Products
542 South Dearborn Street Chicago, Ill.

For Sale

Limestone Quarry, 200-Ton Capacity, in Central Iowa. In good condition and operating every day. Priced to sell. Address care this paper.

Box 1717, care of Rock Products
542 So. Dearborn St., Chicago, Illinois

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

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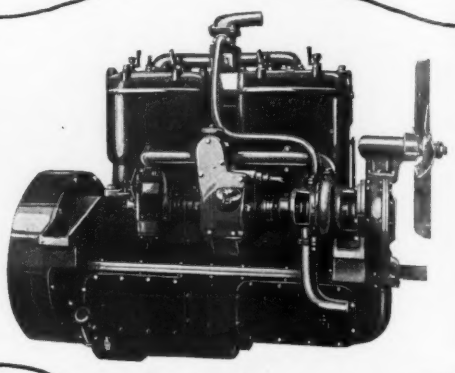

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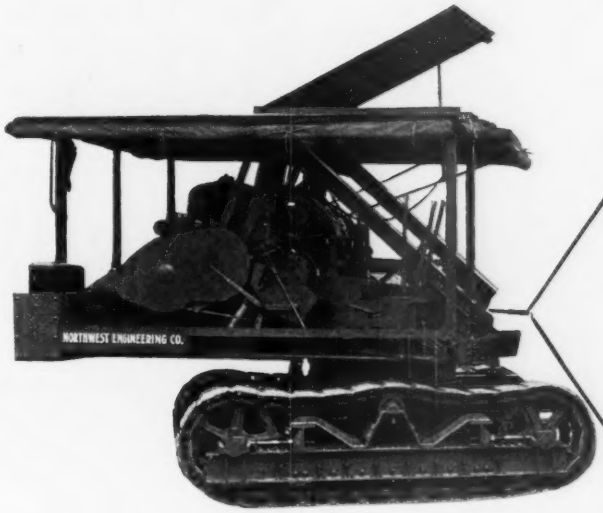

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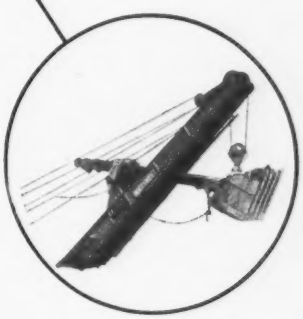

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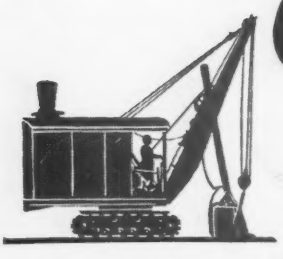

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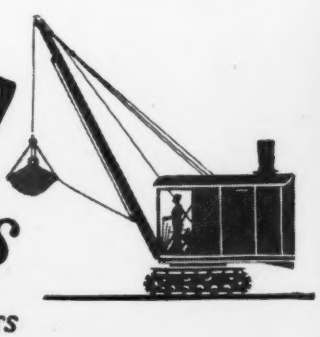

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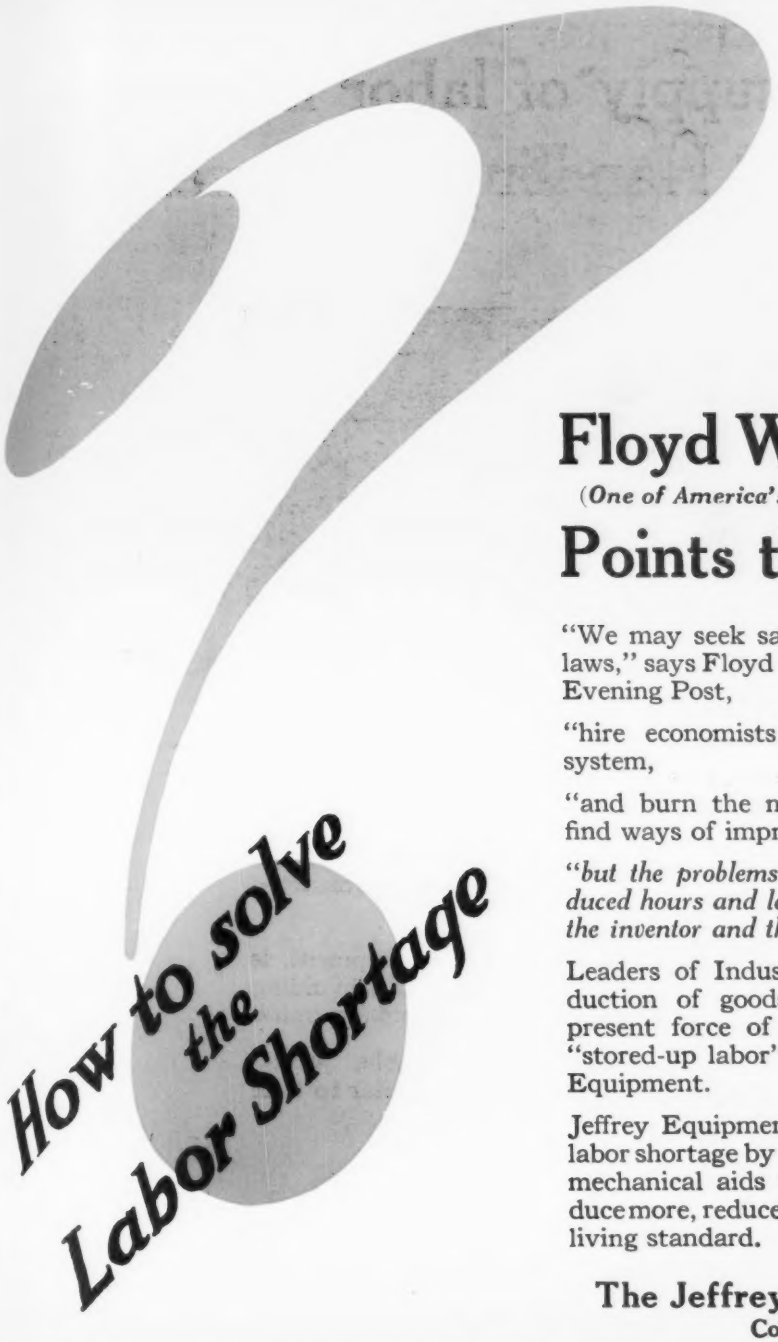

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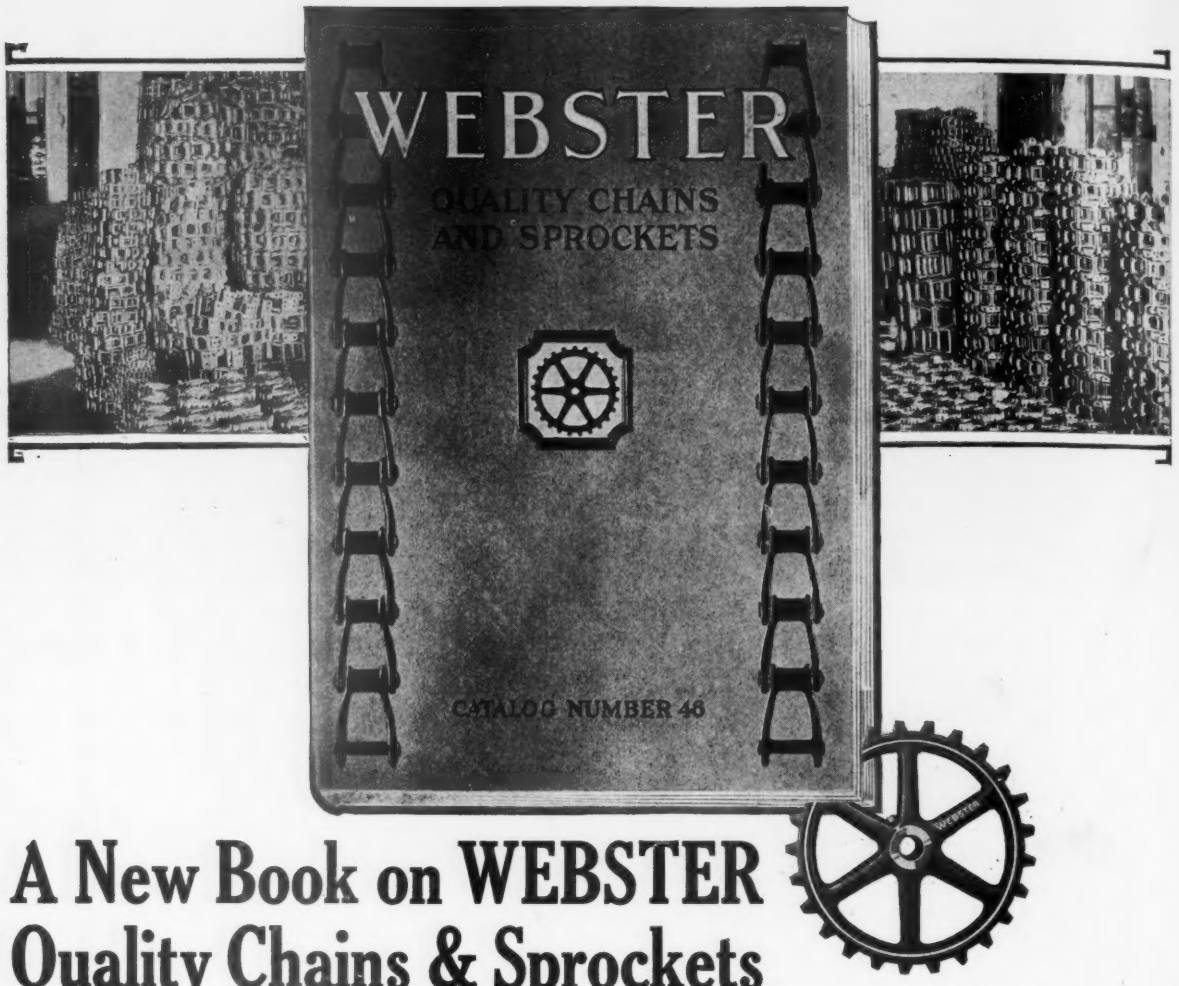

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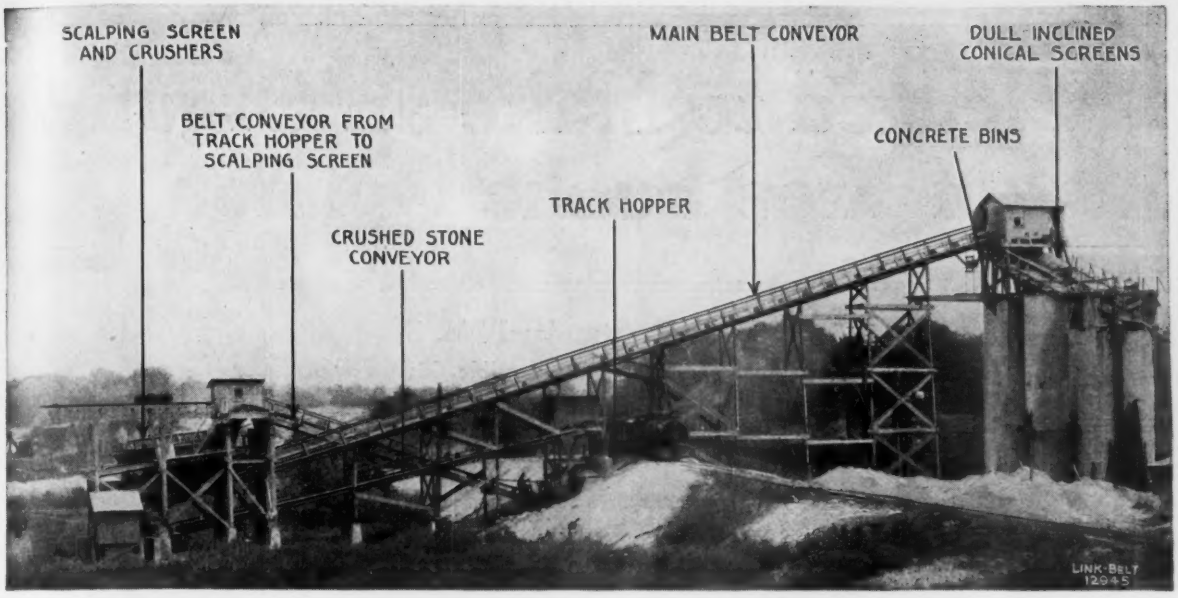

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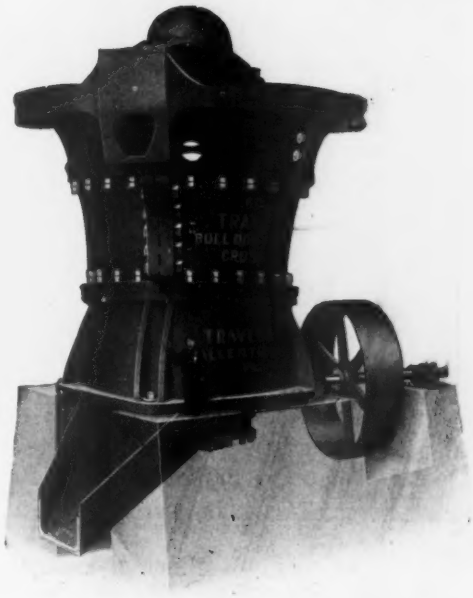

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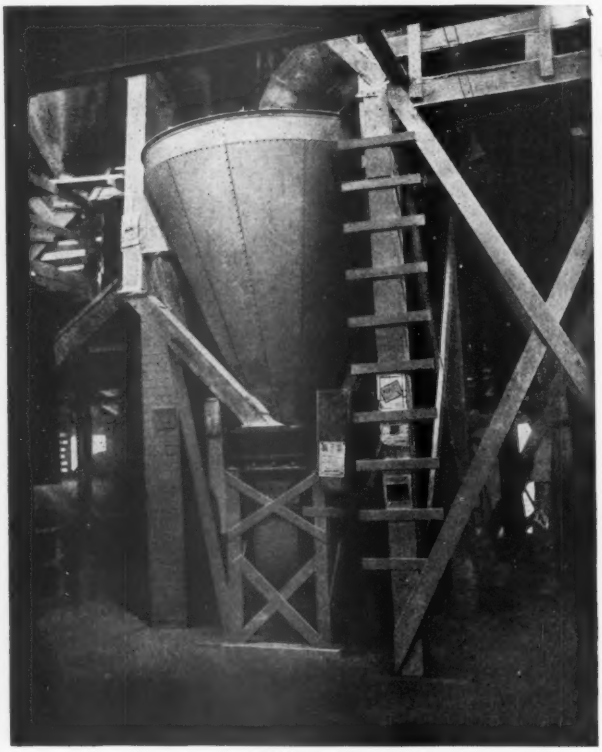

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